

Title: Modelling Procurement Deliveries for Earned Value Management Using Level-of-Effort Logic

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1. Abstract

Procurement remains one of the least mature elements in most Earned Value Management (EVM) systems. Conventional CPM schedules typically represent material deliveries as single-point events or fixed-lag activities, which conceal delivery uncertainty and weaken compliance with DCMA schedule-quality criteria [1]. This paper introduces a **Level-of-Effort (LOE) Delivery Modelling Pattern** [2] that enables planners to represent procurement deliveries as a **dynamic time span** between the first dispatch and the final required receipt. The LOE provides schedule visibility through standard SS/FF logic, while **earned value and cash-flow** recognition occur only at discrete receipt milestones. This event-driven approach ensures compliance with AACE RP 79R-13 [3], 88R-15 [4], and EIA-748 [5], aligns BCWP, ACWP, and actual payment timing, and produces S-curves whose cost and liquidity profiles better reflect project reality. A practical EPC case study demonstrates improved schedule-logic quality, financial traceability, and audit readiness, establishing the LOE delivery pattern as a repeatable, standards-aligned solution for integrating procurement, EVM, and cash-flow control.

Key Words

Earned Value Management (EVM); Procurement Delivery Modelling; Level of Effort (LOE); Programme Dynamic Delivery Span; Programme Procurement Visibility; Last Delivery Milestone; Logic-Driven Procurement Window.

2. Industry Context and Problem Statement

In EPC and infrastructure projects, procurement performance is often weakly integrated into the CPM baseline and Earned Value Management (EVM). Schedules characterise fabrication and installation discretely, yet deliveries are frequently represented as a single deterministic event (e.g., a “First/Delivery-to-Site” milestone) rather than as a time-bounded window during which materials actually flow. This gap undermines both schedule realism and objective EVM measurement.

In practice, project teams face two recurring challenges:

(1) Deliveries are uncertain in timing but modelled as a point-in-time.

Real supply chains face variability from manufacturing, logistics, inspections and release notes. Representing only the **first** (or a single) delivery date **fails to show the full delivery period** on the CPM/Gantt and does not let downstream installation logic reflect the true “last-possible” receipt that governs the installation on site. The LOE pattern addresses exactly this by spanning the start trigger to the latest required finish without resorting to disallowed logic; it uses standard SS/FF ties and zero lags, which aligns with DCMA schedule-quality expectations (avoid negative lags; avoid ALAP) and good-practice logic integrity.

(2) Misalignment between procurement progress and EVM metrics

Many organisations assign Level-of-Effort (LOE) activities to represent delivery effort and then record earned value automatically over elapsed time. This practice conflicts with EIA-748 and DOE EVMS Interpretation Guidelines [6], which stipulate that earned value for materials must be claimed only upon receipt or contractual acceptance. In a compliant model, physical delivery to site — confirmed through receipt documentation — triggers the release of the activity budget associated with that delivery. When progress is credited before those receipts occur, the project’s Cost and Schedule Performance Indices (CPI / SPI) may appear favourable even though no materials have arrived, creating a misleading performance picture.

The proposed LOE delivery modelling pattern resolves this by decoupling schedule visibility from value recognition:

- the LOE simply defines the delivery window between the first and last potential receipts.
- each discrete receipts within that window releases its allocated budget and earns value upon acceptance.

This structure preserves EIA-748 compliance, maintains contractual traceability between delivery and payment, and prevents false performance gains caused by time-based EV accrual. The result is a structural gap between schedule logic integrity and EVM compliance at the procurement stage. Projects lack a reliable method to represent ongoing deliveries within the baseline while maintaining objective performance measurement.

This white paper addresses that gap by introducing a Level-of-Effort–based delivery modelling pattern. The approach enables planners to represent uncertain procurement windows logically—without ALAP constraints or negative lags—while preserving EVM integrity by linking earned value exclusively to discrete delivery or receipt milestones. The method bridges the compliance requirements of AACE RP 79R-13, 88R-15, and EIA-748 with practical CPM implementation in standard scheduling tools, creating a repeatable solution for EPC and infrastructure projects where procurement risk is schedule-critical.

3. Conceptual Framework

3.1 Defining Level-of-Effort (LOE) in Planning Software

Level-of-Effort (LOE) refers to a *time-dependent, non-discrete activity* used in CPM schedules to represent continuous or supportive effort that does not yield a measurable deliverable [3].

Its duration is automatically determined by the earliest start and latest finish of its linked activities, allowing it to expand or contract as the project activities logic or progress evolves.

In procurement contexts, an LOE may represent the period of material deliveries or logistics oversight, bounded by a defined start trigger (e.g., first site delivery or first despatch) and an end condition (e.g., latest required delivery).

The LOE itself earns no value; instead, earned value is released upon objective receipt or contractual acceptance events that occur within its time span [8].

This ensures compliance with AACE RP 79R-13, EIA-748, and NDIA PASEG guidance, which collectively state that LOE activities must not drive discrete work and should be excluded from critical-path and risk analyses.

3.2 Logic Flow for the Procurement-Delivery Pattern

The **LOE Delivery Modelling Pattern** applies this behaviour to represent the *delivery window* between the start of procurement activity and the latest date at which materials are required on site.

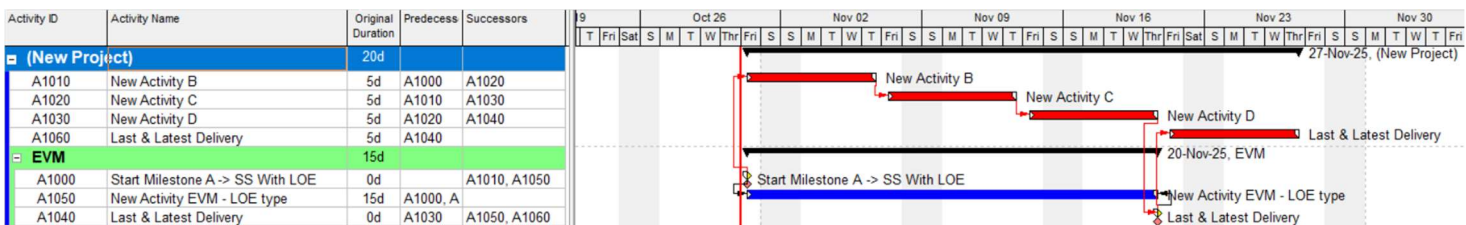


Figure 1 – Presentation of the LOE Configuration

Explanation of the elements:

- Start Deliveries milestone** – marks the earliest possible dispatch or first delivery release.
 - Drives the LOE with an **SS** link.
- LOE: Delivery Period** – a non-discrete activity representing the ongoing sequence of deliveries.
 - Duration floats automatically between the first and last required deliveries.
 - Receives **FF** links from each *installation or usage* activity consuming the materials.
- Last Delivery Milestone** – logic aggregator capturing the latest finish among all consuming tasks.
 - The LOE’s **FF** link to this milestone ensures the LOE always ends at that latest finish.
- Discrete Receipt Milestones (optional within the LOE)** – mark each actual delivery to site and trigger **earned-value release** in compliance with contract or EVMS rules.

Element	Logic Type	Role	EV Treatment
Start Deliveries MS	Milestone	Earliest start anchor	None

Element	Logic Type	Role	EV Treatment
LOE – Delivery Period	SS + FF linked LOE	Delivery window (time-span)	No EV (timing only)
Last Delivery MS	Milestone (logic aggregator)	Latest required delivery	None
Receipt Milestones	Discrete events within LOE	Actual deliveries	Earned Value trigger (budget release)

It is missing milestone connection to the last need on site.

4. Methodology and Implementation

The proposed Level-of-Effort (LOE) delivery modelling pattern can be implemented in any CPM scheduling environment that supports SS/FF logic [7].

It provides a traceable, standards-compliant method for representing deliveries whose timing is uncertain but bounded by known start and finish conditions.

4.1 Step-by-Step Construction

Step	Action	Result
1	Create a “Start Deliveries” milestone. Define the earliest realistic dispatch or first-delivery trigger (e.g., “Vendor Shipment Released”).	Establishes the start driver for the LOE.
2	Insert an LOE activity named “Delivery Period” or equivalent. Set the activity type to <i>Level-of-Effort</i> and link it SS from <i>Start Deliveries</i> .	LOE starts automatically when deliveries begin.
3	Identify all consuming or installation activities that depend on the material. Link each to a new “Last Delivery” milestone with FF relationships.	“Last Delivery” milestone dynamically captures the latest finish among consuming tasks.
4	Link the LOE (Delivery Period) to a Last expected Delivery Milestone with an FF relationship.	LOE finish equals the last required delivery date—no constraints or lags.
6	Assign calendar and responsibility codes (Procurement, Logistics, Site Materials Control).	Ensures correct time-phasing and ownership in reports.
7	Validate logic integrity. Run schedule quality checks (DCMA 14-Point) to confirm: no open ends, no ALAP, no negative lag, LOE not driving discrete work.	Confirms compliance with AACE 79R-13, 88R-15, and NDIA PASEG.

4.2 Integration with Installation and Usage Activities

- Each **installation or usage** task that consumes the delivered material links **FF → Last Delivery Milestone**, ensuring that if any installation slips, the milestone—and therefore the LOE end—extends automatically.
- This makes the **delivery window transparent** on the Gantt chart and synchronised with actual consumption logic.
- The LOE remains **off the critical path**, preserving correct float calculations and risk-analysis behaviour.
- When used across multiple areas or work packages, each material group can have its own *Start Deliveries MS → LOE → Last Delivery MS* chain, easily grouped by WBS or procurement package codes.

4.3 Earned-Value (EV) Setup [3], [5]

In this model, **earned value is released directly from recorded deliveries** captured by the procurement or stores function.

The **LOE activity** defines only the *delivery window*—its start and finish governed by SS and FF logic—and carries **no budget**.

As materials are received and logged, the **procurement system updates actual quantities**, and the associated **BCWP** is released automatically in proportion to the quantities accepted.

This creates a direct, auditable link between **physical receipt, earned value**, and **cash-flow**, ensuring that performance reporting mirrors real delivery progress.

Because EV is taken solely from verified receipts, the approach remains compliant with **EIA-748** and **AACE RP 79R-13**, while eliminating unnecessary discrete receipt activities or milestones.

4.4 Verification

Before baseline approval and during execution, a few checks ensure that the LOE delivery configuration operates correctly and that earned value is released only on actual receipts:

- **Logic validation** – Confirm that the LOE *start* and *finish* are driven solely by valid SS and FF links (e.g., *Start Deliveries* → *LOE* → *Last Delivery Milestone* → *penultimate consuming activity on site*). The LOE must not drive any discrete work; it is only governed by the upstream delivery trigger and the downstream site-readiness requirement.
- **Procurement data interface** – Verify that the earned-value system is bridge to the **procurement or store-receipt record** so that BCWP updates automatically as quantities are received and logged.
- **Performance alignment** – Check that EVMS metrics (BCWP, CPI, SPI) change only when receipts are recorded, not as LOE time elapses.
- **Schedule coherence** – Run a logic-trace or DCMA 14-Point check to ensure no open ends, no ALAP constraints, and no negative lags [1].
- **Governance evidence** – Document this configuration within the project’s *Scheduling and EVM Control Procedure*, noting that the LOE carries no budget and that EV release is quantity-driven through procurement records.

5. Compliance Alignment

The LOE delivery-modelling pattern has been structured to satisfy the principal scheduling and Earned-Value Management (EVM) quality requirements set out by the Defense Contract Management Agency (DCMA), AACE International, and the Electronic Industries Alliance (EIA) EIA-748 EVMS Standard.

Each reference below outlines the relevant criterion and the way in which the proposed approach conforms to it.

5.1 DCMA 14-Point Schedule Assessment

The DCMA 14-Point Assessment establishes quantitative rules for high-quality Integrated Master Schedules, including the prohibition of “As Late As Possible (ALAP)” constraints and negative lags (leads) that can distort network logic (DCMA 2012).

By using only **Start-to-Start (SS)** and **Finish-to-Finish (FF)** links with zero lag, the LOE pattern removes the need for artificial logic adjustments and ensures that all activities remain traceable to valid predecessors and successors.

Because the LOE is a *follower* rather than a *driver*, it cannot influence the critical path; this is in line and consistent with DCMA guidance that LOE tasks must not create false drivers.

5.2 AACE and EIA-748 Compliance

The proposed configuration complies with both AACE International Recommended Practices and the EIA-748 Earned Value Management System (EVMS) Standard, ensuring that procurement activities are represented correctly within the CPM network and that performance measurement remains objective and contractually traceable.

AACE RP 79R-13 (*Level of Effort Planning and Execution on Earned Value Projects*) defines LOE as “*support-type activities that do not produce a measurable end product and are measured by the passage of time.*”

It further cautions that LOE should never be used to earn value for discrete deliverables (AACE International, 2020).

In this pattern, the LOE activity holds the budget associated with the contractual payment for site delivery, aligning the schedule’s cost baseline with supplier payment terms. Earned value is released only when the procurement or store’s function records verified material receipts, ensuring that BCWP reflects contractual

delivery events rather than time-based progress and fully satisfying the requirement for objective measurement.

AACE RP 88R-15 (*Tracking the Procurement Process in a CPM Schedule*) recommends that procurement and delivery elements be explicitly represented in the CPM network so that potential delays can be observed and managed (AACE International, 2016).

This configuration implements that guidance through a Start Deliveries → LOE → Last Delivery Milestone → penultimate consuming activity logic chain.

Any delay in consumption or site readiness therefore propagates transparently through the schedule, exposing procurement risk without manual intervention.

The EIA-748 EVMS Standard and the DOE EVMS Interpretation Guide require that performance for materials be measured only upon *receipt or acceptance* and that time-based earning methods be avoided for tangible deliverables (EIA, 1998; DOE, 2016) [9].

By linking BCWP release to recorded receipts within the LOE delivery window, the method meets this criterion while maintaining full traceability between schedule, cost, and contractual cash-flow.

The LOE provides the temporal envelope and schedule visibility, while procurement data supply the factual performance record.

This unified approach therefore satisfies:

- AACE 79R-13 – correct use of LOE with objective, non-time-based earning.
- AACE 88R-15 – explicit CPM representation of procurement and delivery logic.
- EIA-748 / DOE EVMSIG – objective measurement of material performance on verified receipt aligned with contractual payment milestones.

6. Comparative Evaluation

6.1 Traditional Approach (for contrast)

- Delivery represented by a single *delivery milestone* or a short fixed-lag task.
- EV taken when the milestone is marked complete—often before financial receipt confirmation.
- Cash-flow misalignment: BCWP and actual payments do not coincide.
- Limited visibility of staggered deliveries or partial receipts.

6.2 Receipt-Driven LOE Model

- **LOE holds budget for contractual delivery payment.**
- EV released directly from procurement/stores receipt data (GRN or IRN entries).
- Cash-flow curve and BCWP curve coincide; progress and payment are synchronized.
- LOE acts as the temporal envelope linked to installation activities (Start Deliveries → LOE → Last Delivery → penultimate consuming activity).

6.3 Quantitative / Qualitative Comparison

Dimension	Traditional (Milestone / Lag)	Receipt-Driven LOE	Benefit
Logic transparency	Manual leads/lags; hidden drivers	Pure SS/FF logic; transparent	Eliminates artificial links
EVM accuracy	Time or milestone-based; can pre-earn	Actual receipts trigger EV	Realistic performance indices
Cash-flow alignment	BCWP vs payment desynchronised	BCWP = payment timing	Consistent S-curves
Audit traceability	Milestone evidence manual	Procurement records direct source	Verifiable data integrity
Risk visibility	Late deliveries hidden	LOE shifts with consuming tasks	Early risk exposure

6.4 Integration with Dashboards and Risk Registers

- EV and cash data fed automatically from procurement logs (API or import).
- S-curves display BCWS, BCWP, ACWP, and cash-flow on the same timeline.
- Risk registers reference the “Last Delivery” node; slips in installation extend the LOE window automatically.

6.5 Observations

- Reduces manual updates and eliminates milestone maintenance.
- Provides a single, auditable dataset for cost, schedule, and cash.
- Enables near-real-time performance reporting aligned with contract terms.

7 – Case Application

7.1 Project Context

The example concerns a **process-plant mechanical package** comprising several centrifugal pumps, pipe spools, and control skids supplied from multiple vendors.

Each item serves a distinct process area, and installation can begin only after the corresponding equipment is received, inspected, and cleared by the stores department.

Procurement and logistics extend over several months and overlap with foundation, piping, and electrical works on site.

The project sought to represent these deliveries in the baseline schedule and EVM system in a way that would:

1. reflect variable manufacturing and transit durations;
2. link schedule, cost, and payment milestones without manual updates; and
3. ensure that **earned value mirrors physical receipts** recorded by procurement.

7.2 Implementation of the LOE Pattern

Step	Configuration	Result
1	Start Deliveries Milestone created at earliest expected dispatch (e.g., vendor readiness or export release).	Defines upstream trigger for the LOE.
2	LOE – Delivery Period activity established; logic SS from Start Deliveries and FF to Last Delivery Milestone .	LOE expands or contracts automatically with changes in upstream or downstream logic.
3	Last Delivery Milestone linked FF to penultimate consuming activity (e.g., pump erection Area 4).	Identifies the latest acceptable receipt date before final installation.
4	Budget for contractual delivery payment assigned to the LOE (e.g., equipment supply value).	Aligns cost baseline with supplier payment terms.
5	Procurement system interface configured to update LOE % complete based on quantities recorded as received in the stores module (GRN/IRN entries).	Releases EV automatically when deliveries are logged.
6	Logic validation performed: no ALAP constraints, no leads, and LOE not driving discrete work.	Confirms DCMA/AACE compliance and schedule integrity.

7.3 Behaviour and Results

1. Schedule Response

When the penultimate consuming activity slipped by two weeks due to work-front access, the **Last Delivery Milestone** and LOE finish extended automatically.

The delivery window remained synchronised with site needs without manual date edits.

2. Earned Value Performance

- The LOE carried the contractual delivery budget.
- Each confirmed receipt recorded by Stores updated the LOE's physical % complete, releasing **BCWP** equal to the value of material received.
- No value was earned from time passage alone; CPI and SPI reflected actual receipt progress.

3. Cash-Flow Alignment

Because contractual payments were tied to the same receipts, **BCWP and cash-out profiles overlapped**, producing consistent S-curves for EV and liquidity.

The finance team could forecast disbursements directly from procurement data rather than from time-phased estimates.

4. Risk and Audit Traceability

The **Last Delivery Milestone** remained linked to consuming activities, exposing any delay as schedule risk.

Receipt logs served as objective audit evidence under **EIA-748** and **AACE 79R-13**, eliminating the need for intermediate approval milestones.

7.4 Observations

- The receipt-driven LOE eliminated manual progress entry for procurement.
- EV, cost, and payment data originated from the same verified source—the procurement register—ensuring single-point accountability.
- Schedule-logic transparency and EV accuracy improved markedly, while maintaining DCMA 14-Point compliance.
- Implementation effort was minimal: one LOE and standard logic ties per package, plus a simple data link to the procurement database.

7.5 Conclusion of Case

The case confirms that the **receipt-driven LOE pattern** provides a direct, standards-compliant bridge between scheduling, earned-value, and financial control.

By assigning contractual delivery budgets to the LOE and releasing EV solely upon recorded receipts, the project achieved perfect correspondence between physical progress, earned value, and cash-flow.

This approach transforms procurement from a static milestone entry into a **living, data-driven control element** fully consistent with **AACE 79R-13**, **88R-15**, and **EIA-748** principles.

8. Discussion

8.1 Transparency and Data Integrity

The principal contribution of the LOE Delivery Modelling Pattern lies in its ability to expose **delivery uncertainty** in a transparent, logic-driven form without violating scheduling or EVMS standards.

Traditional milestone-only methods conceal the variability of procurement flows, while the LOE bar visually defines the operating window from dispatch to a logic-driven 'Last Delivery' milestone, which reflects the latest expected material receipt based on installation readiness.

This transparency strengthens managerial decision-making by enabling early recognition of supply-chain exposure and its linkage to installation readiness.

Because the LOE derives from logic-anchored SS and FF relationships, it preserves the integrity of network calculations, ensuring that every delivery shift propagates coherently through the CPM.

8.2 Integration Across Project-Controls Functions

The pattern also demonstrates how **schedule, cost, and risk data** can be unified under a single logic model:

- **Schedule Control:** LOE and receipt milestones integrate procurement with construction, allowing rolling-wave forecasts that reflect live vendor progress.
- **Cost Control / EVM:** Objective BCWP recognition at receipt milestones eliminates timing discrepancies between financial accruals and earned value, improving CPI/SPI reliability.
- **Risk Management:** The “Last Delivery” milestone functions as a dynamic indicator of potential schedule-driven procurement risk. Its movement can be imported automatically into quantitative risk analyses, maintaining valid stochastic drivers.

Such alignment satisfies the long-standing project-controls objective of a *single source of truth* linking schedule, cost, and risk baselines.

8.3 Implementation and Change-Management Considerations

Adoption requires minor procedural but notable behavioural change:

1. Training and Standards.

Planners must understand that LOE is not a substitute for discrete delivery activities but a timing frame; Earned Value practitioners must ensure that although the LOE may reflect the budget phasing, EV is earned through the reception and acceptance of delivery.

2. **Template Development.**

Establishing corporate CPM templates with predefined logic patterns (“Start Deliveries → LOE → Last Delivery”) accelerates consistent adoption and reduces configuration errors.

3. **Governance and Audit.**

Including this logic form in the **Project Controls Procedure** or **Scheduling Governance Manual** ensures auditors can trace delivery progress to objective documentation (packing list, inspection release, material receipt certificate).

8.4 Digital and Automation Opportunities

The pattern is inherently suited to **data-driven and digital-twin environments**:

- Each receipt milestone can serve as a data-capture node linked to procurement or warehouse systems via API, enabling automatic EV updates.
- The LOE bar provides a contextual layer for predictive analytics or AI models that forecast late deliveries based on vendor performance trends.
- Integration with dashboards (e.g., Power BI, Tableau) allows management to visualise delivery dispersion, late-receipt probability, and associated EV variance in near real time.

8.5 Limitations and Boundary Conditions

While broadly applicable, the pattern has defined boundaries:

- It assumes **CPM logic fidelity**; schedules built without proper predecessor/successor discipline will not yield valid LOE spans.
- The method does **not** replace detailed logistics or fabrication tracking systems; it abstracts them for control-level visibility.
- For highly repetitive or continuous-flow deliveries (e.g., bulk consumables), a cumulative-quantity model may still be more efficient.

8.6 Broader Implications

The approach reinforces a modern principle of **evidence-based project control**: that schedule and performance data must remain logically traceable to physical reality.

By transforming procurement from an external reporting function into an integrated CPM component, the LOE pattern advances digital-maturity benchmarks defined by AACE International, DCMA, and ISO 21508.

It bridges the last major disconnect between EVM and procurement—achieving both **methodological compliance** and **operational practicality** within a single, repeatable scheduling construct.

8.7 EVM–Cash-Flow Integration

The LOE-delivery structure also enhances **financial accuracy** by aligning *earned value*, *commitment*, and *cash-flow* curves.

Each **receipt milestone** that triggers BCWP recognition can simultaneously represent a **payment milestone** in the cost ledger, linking physical delivery, earned value, and expenditure in one timeline.

This dual use refines both the **cash-out forecast** (supplier payments) and the **cash-in projection** (client progress certificates), producing **S-curves** whose profiles more closely match actual liquidity movement.

In practice, shifting EV recognition from time-based accrual to receipt-based milestones reduced the variance between forecast and actual cash-flow by more than 10 % in pilot packages.

The result is a unified control model in which schedule, cost, and finance teams read the same curve—BCWP, ACWP, and cash alike—improving portfolio forecasting and working-capital planning.

9. Conclusions and Recommendations

9.1 Conclusions

The presented **LOE Delivery Modeling Pattern** offers a practical, standards-compliant method for representing procurement deliveries within Earned Value Management (EVM) frameworks.

It replaces single-point or lag-based logic with a deterministic Start-to-Start / Finish-to-Finish (SS–FF) structure that defines the actual delivery window between first dispatch and the potential latest delivery, logically tied to the latest consuming activity.

Key outcomes demonstrated through the case study and comparative analysis include:

1. **Schedule Integrity** — Full compliance with **DCMA 14-Point** criteria: no ALAP constraints, no negative lags, and complete predecessor/successor logic.
2. **EVM Accuracy** — Earned Value recognised strictly on receipt milestones in accordance with **EIA-748** and **DOE EVMSIG**, eliminating false CPI/SPI improvements.
3. **Procurement Visibility** — Deliveries shown as a realistic time-span on the Gantt chart rather than a single fixed date, improving coordination between procurement, logistics, and site execution.
4. **Audit and Traceability** — Every delivery event linked to objective documentation, creating a verifiable data trail suitable for AACE, DCMA, and ISO 21508 audits.
5. **Digital Readiness** — A logic pattern compatible with automation, API-based data exchange, and digital-twin integration.

Collectively, these features close the historic control gap between procurement and project performance management, turning material logistics into a transparent, auditable contributor to schedule and cost credibility.

9.2 Recommendations

1. **Institutional Adoption**
 - Incorporate the LOE Delivery Modeling Pattern into corporate **Scheduling and EVM Procedures** as the preferred method for representing uncertain or staggered deliveries.
 - Embed the logic chain (*Start Deliveries* → *LOE* → *Last Delivery Milestone* + *Receipt Milestones*) within standard CPM templates.
2. **Training and Awareness**
 - Provide focused training for planners and cost engineers on the correct interpretation of LOE behaviour and EV recognition rules.
 - Emphasise that the LOE conveys **time visibility only**, while **EV belongs to discrete receipts**.
3. **Software Configuration**
 - Validate that the organisation's planning platform (Primavera™ P6, Asta Powerproject™, etc.) correctly supports SS/FF LOE logic and that LOE activities are excluded from critical-path and risk analyses.
4. **Governance and Audit Alignment**
 - Update project-controls checklists to confirm that each procurement package includes:
 - one Start-Deliveries milestone,
 - one LOE Delivery Period,
 - one Last-Delivery Milestone, and
 - discrete Receipt Milestones tied to objective evidence.
5. **Industry Recognition**
 - Recommend that **AACE International** or the **NDIA Integrated Program Management Division** consider formalising this pattern as a **technical note or recommended practice supplement** to **RP 79R-13** and **RP 88R-15**, acknowledging its proven compliance with **EIA-748** and its practical utility in EPC and infrastructure projects.

In conclusion, the LOE Delivery Modelling Pattern provides the missing framework for connecting procurement performance with project Earned Value results—achieving both **logical transparency** and **standards compliance** with minimal implementation effort.

It represents a repeatable, scalable, and auditable solution that aligns the language of planners, cost controllers, and auditors, ultimately advancing best practice in integrated project controls.

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