Comac: A Neutral System of Record for AI Provenance and Verification

Comac Systems

Abstract

Deployed AI systems change over time. Enterprises and regulators increasingly require defensible documentation of how those systems were built, modified, and operated—yet no neutral, external system of record exists today. This note outlines the need for such a layer, the design principles behind Comac (a proof-only registry for provenance, lineage, and verification), and its relevance to procurement, audit, and regulatory compliance. We support the argument with industry statistics, regulatory references, a concise formalisation, and illustrative diagrams.

1 Introduction

AI systems are iterated after deployment. Models are fine-tuned, pipelines updated, and dependencies changed. In many high-stakes settings—enterprise use, public-sector deployment, regulated domains—organisations must demonstrate not only what a system does, but *what it was* at a given time and *how it changed.* Absent a defensible record of provenance and lineage, outcomes become harder to justify to auditors, procurers, and regulators.

Evidence from industry underscores the pace of change. A 2023 survey of 650 IT, DevOps, and Platform Engineering decision makers found that most organisations expect to update their AI models **quarterly**.[1] In 2024, one major platform reported **1,018%** more AI models registered for production than in 2023.[2] **60%** of AI application builders had switched LLM providers within six months.[3] Documentation that cannot keep pace with iteration is of limited use for audit or compliance.

The Comac Registry addresses this gap by acting as a neutral, external system of record. It does not store models, training data, or inference payloads. It records proofs and attestations: what exists, how it changed, and what can be independently verified.

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[1] https://www.statista.com/statistics/1449043/frequency-of-ai-model-updates-in-business/

[2] Databricks State of Data + AI.
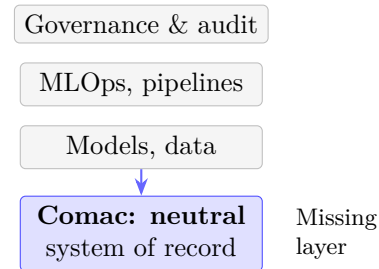
[3] Vercel State of AI, 2024–2025.

Figure 1: The AI stack and the missing neutral layer.

2 The Missing Layer

The typical AI stack includes models, pipelines, MLOps tooling, and governance solutions. Missing is a *neutral, external* system of record independent of any single vendor or deployment. In-house logs and vendor dashboards are valuable but not sufficient for cross-organisational or regulatory scrutiny.

Figure 1 illustrates the gap. A shared, append-only registry of attestations provides a single reference that procurement, security, and compliance teams can rely on.

3 Formalisation: Provenance, Lineage, Verification

We denote by $\mathcal{R}$ the registry. For a given AI asset or system A, we distinguish three functions:

- **Provenance** $P(A)$: stable, referenceable record of what exists—identity, metadata, references to external artefacts.

- **Lineage** $L(A)$: history of how A changes—modifications, versions, dependencies.

- **Verification** $V(A)$: attestations enabling independent verification without access to weights, data, or inference.

The registry stores (P, L, V)-related attestations only. Formally, $\mathcal{R} \subseteq$ Attestations; models, datasets, and inference I/O remain outside $\mathcal{R}$. Operators retain full control.

Figure 2 summarises the design. Comac implements P, L, and V operationally as a single registry.

4   Trust and Architecture

Comac does not access model weights, training data, or inference payloads. The architecture is *proof-only*. The registry is separate from AI operations: it does not execute models or process inference. It records attestations. Verification is independent and append-only.

Figure 3 shows the separation. Enterprise and public-sector users can adopt Comac without ceding control of sensitive assets.

5   Regulatory and Standards Context

5.1   EU AI Act

The EU AI Act imposes documentation and registration obligations on high-risk AI systems. Technical documentation (Article 11, Annex IV) and registration (Article 49, Annex VIII) require providers to submit and maintain up-to-date information.[4] A neutral, append-only registry of provenance and lineage supports these requirements.

5.2   NIST AI RMF

The NIST AI Risk Management Framework and its Generative AI Profile emphasise documentation, transparency, and accountability.[5] A proof-only registry aligns with AI RMF objectives by enabling traceability and verification.

5.3   OMB M-24-10

OMB Memorandum M-24-10 (March 2024) establishes binding requirements for federal agencies to govern AI use.[6] A neutral system of record for provenance and lineage can support these obligations.

6   Institutional Relevance

Procurement and security. Teams need evidence of how AI systems behave and evolve. Comac Verified signals that a system has been recorded with provenance and lineage attestations—verifiability, not endorsement.

Regulatory and audit. Frameworks (e.g. EU AI Act) expect documentation of high-risk AI systems. A neutral, append-only registry provides a consistent, auditable reference for regulators and auditors.

Governance. Comac aligns with AI governance and AI TRiSM principles. It supports documentation for audit and regulatory review.

7   Conclusion

Comac provides a neutral system of record for AI provenance, lineage, and verification. It fills a missing layer: an external, proof-only registry that enterprises and regulators can use to establish defensible documentation without consolidating model or operational data. The live registry is at https://registry.comac.network.

References

[1] Nutanix/Statista. AI model update frequency in businesses worldwide, 2023. https://www.statista.com/statistics/1449043/frequency-of-ai-model-updates-in-business/

[2] EU AI Act, Annex IV. https://artificialintelligenceact.eu/annex/4/

[3] EU AI Act, Annex VIII. https://artificialintelligenceact.eu/annex/8/

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[4] https://artificialintelligenceact.eu/annex/4/, https://artificialintelligenceact.eu/annex/8/

[5] https://www.nist.gov/itl/ai-risk-management-framework/ai-risk-management-framework-resources

[6] https://www.whitehouse.gov/wp-content/uploads/2024/03/M-24-10-Advancing-Governance-Innovation-and-Risk-Management-for-pdf
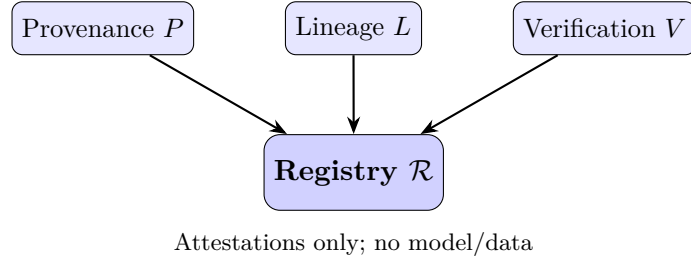
Attestations only; no model/data

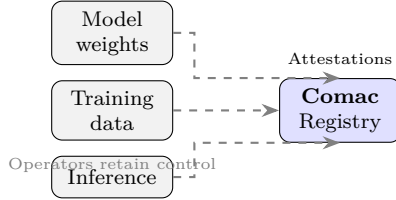**Figure 2:** The three functions P, L, V feed the proof-only registry $\mathcal{R}$.

Figure 3: Proof-only design: operators hold data; registry receives attestations only.

[4] NIST. AI RMF — Resources. https://www.nist.gov/itl/ai-risk-management-framework/ai-risk-management-framework-resources

[5] NIST. AI RMF: Generative AI Profile, 2024. nist.gov/generative-ai-profile.

[6] OMB. M-24-10, March 2024. whitehouse.gov/OMB-M-24-10.

[7] Comac Registry. https://registry.comac.network