

AI Asset Maturity

# Measuring the Readiness of Data, Models, Prompts, Pipelines, Agents & AI Systems

Building on TRL, DRL, MLTRL, and new dimensions – **SecRL** · **GovRL** · **OpsRL**

MARCH 30, 2026

LEGO V FRAMEWORK

# What is AI Asset Maturity?

Not just another framework – a **practical synthesis of existing ones**, designed to bring shared language across business, technology, risk, legal, and leadership.

## AI Assets Defined

Any identifiable, reusable component carrying value *and* risk: datasets, features, models, prompts, agents, workflows, pipelines, services, and governance artifacts (AI-BOM, model cards, risk registers).

## The Core Goal

Move from "**feeling-based**" management to a rigorous, shared readiness language. Every team – from engineers to executives – speaks the same maturity dialect.

## The AIA-RL Principle

Every AI system receives an **AIA-RL\_min score** – the lowest of 5 readiness dimensions – which directly caps its credible TRL. Weakest link governs deployability.



# Why Measure AI Asset Maturity?

Organizations already run scoring models, recommenders, generative AI, RAG, and agents – often in **shadow mode**. Yet many remain stuck at POC. TRL tells you if the *system* is ready. Asset maturity tells you *what it rests on*.

## Root Causes of Stagnation

- Unready or ungoverned data pipelines
- Missing MLOps industrialization
- Insufficient risk framing & ownership

## Real-World Incidents

Leaks, bias, hallucinations – nearly all share the same structural root causes that asset maturity directly addresses.

## Regulatory Pressure is Real

- **EU AI Act** – traceability & high-risk classification
- **ISO/IEC 42001** – AI management system standard
- **NIST AI RMF** – risk governance & documentation

📄 **Key Takeaway:** Regulators demand evidence of readiness – not intent. Asset maturity provides that evidence.

# Value for All Stakeholders

AI asset maturity is not a technical artifact alone – it is a **cross-functional instrument** that answers different critical questions for every audience in the organization.



Data · ML · Engineering ·  
Ops

Prioritize feature stores, monitoring, adversarial testing, and pipeline automation. Know exactly which assets need uplift before the next release gate.



Leadership & Strategy

"Is this solution truly deployable? What's the real foundation? Can it be reused across business units?"  
Asset maturity turns gut feel into governed decisions.



Governance & Compliance

Shared responsibility replaces the heroic lone Model Owner. AI-BOM and fact sheets become audit artifacts – and competitive differentiators in B2B/B2G markets.



Business & Commercial

Identify proprietary datasets and robust models worth heavy investment. AI-BOM becomes a credibility signal in regulated markets and procurement processes.

"AI asset maturity is about who decides, who signs... and who dares to say '**not yet**'."

# Panorama of Existing Frameworks

A maturity **Pokédex** – we are not inventing new frameworks from scratch. We are adapting, synthesizing, and extending proven ones with three new asset-centric readiness dimensions.

## Established Frameworks

### TRL (NASA)

Technology Readiness Levels  
– the universal system  
readiness language

### DRL (Lawrence, 2017)

Data Readiness Levels –  
from hypothetical data to  
certified, reusable assets

### MLTRL (Lavin et al., 2022)

ML Technology Readiness  
Levels – TRL adapted to the  
full ML lifecycle

### MLSMM (Jedrzejewski, 2023)

ML Security Maturity Model –  
adversarial resilience for ML  
systems

### ISO/IEC 42001 · NIST AI RMF

International governance and  
risk management standards  
for AI systems

## New Asset-Centric Adaptations

### SecRL

Security Readiness Levels –  
inspired by MultiRATE &  
AISPM posture management

### GovRL

Governance Readiness Levels  
– asset-centric NIST AI RMF +  
ISO 42001

### OpsRL

Operations Readiness Levels – MLOps maturity + operational  
assurance

Together, these five dimensions form the **AIA-RL composite score**.

# TRL – Technology Readiness Levels

The **universal language of system readiness**, originally developed by NASA and now adopted across engineering disciplines, defense, and increasingly AI governance. Ranges from 1 (basic research) to 9 (fully operational system).



Each phase represents a qualitative leap in systemic confidence, documentation rigor, and stakeholder accountability.

## Standard Use in AI Projects

TRL remains the default gate criterion in most enterprise AI program offices. It aligns with stage-gate processes, funding decisions, and architecture reviews – making it the natural anchor for asset maturity integration.

### ⚠ Generative AI Caveat

Most LLMs, agents, and multimodal systems realistically sit in the **TRL 3–7 zone** – even when already used by end-users in production environments (AI Watch, 2023). High user adoption ≠ high system readiness.

# DRL – Data Readiness Levels

Neil Lawrence's Data Readiness Levels – condensed into a **5-step AIA-RL scale** – describe the journey from hypothetical, inaccessible data to fully auditable, regulation-certified, code-like assets.



DRL 1 – Hypothetical / Inaccessible

Band C: Data exists only in someone's head or a legacy system. No pipeline, no access agreement, no schema.



DRL 2 – Accessible but Raw

Band C/B: Data can be retrieved but requires significant manual cleaning. No quality metrics, no versioning.



DRL 3 – Usable & Versioned

Band B: Versioned pipeline in place, basic quality metrics defined, reproducible preprocessing applied.



DRL 4 – Feature Store / Lakehouse

Band A: Automated tests, semantic versioning, cross-project reuse enabled. Data treated as a product.

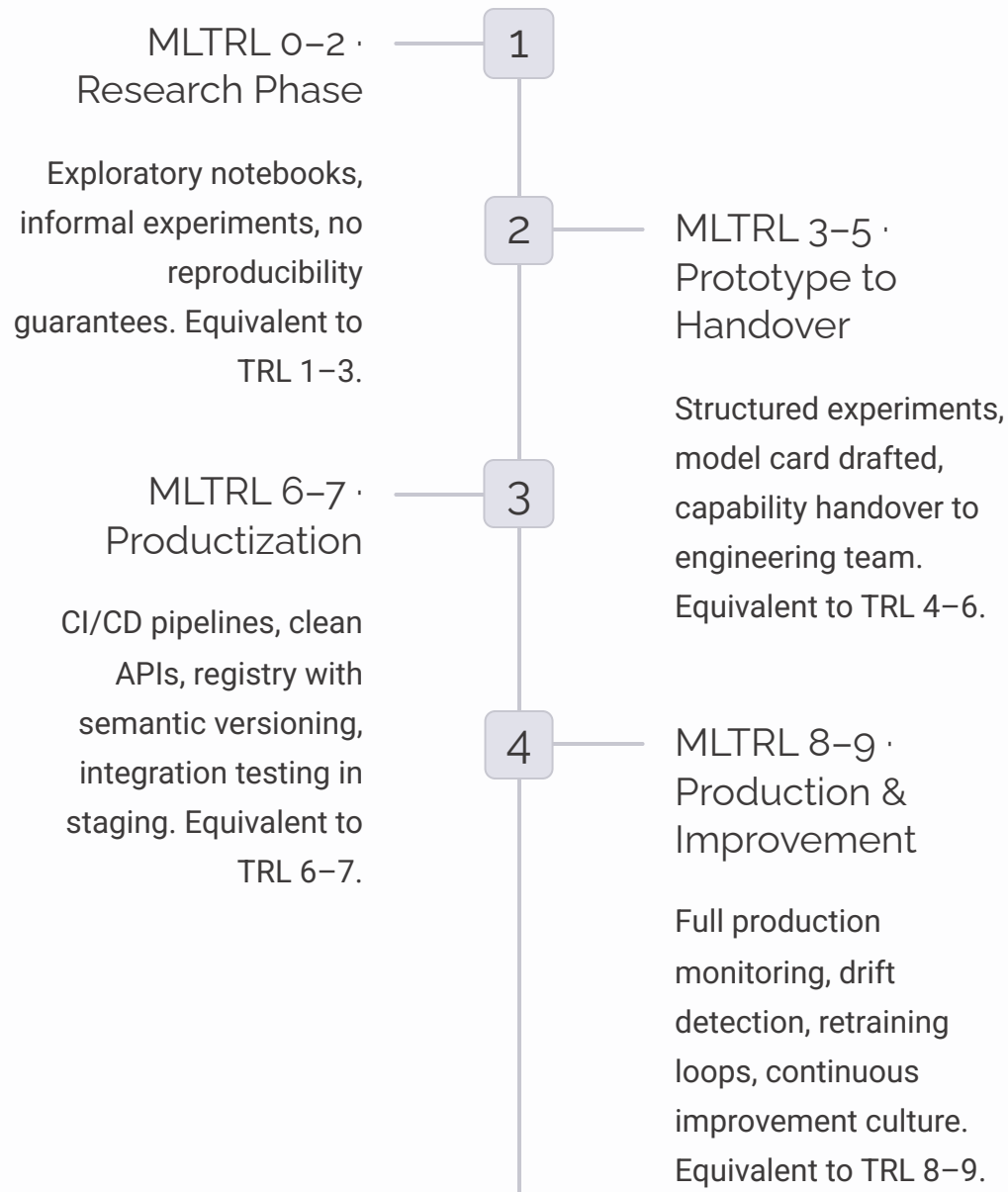


DRL 5 – Fully Auditable & Certified

Advanced Band A: GDPR/AI Act certified, lineage tracked end-to-end, code-like versioning, continuous regulatory compliance.

# MLTRL – Machine Learning Technology Readiness Levels

Lavin et al. (2022) adapted TRL specifically for the ML lifecycle, bridging the gap between research notebooks and production-grade, continuously monitored systems. The AIA-RL MRL dimension maps directly to this ladder.



## Key Transition Points

- **MLTRL 2→3**: From informal to documented – the model card gate
- **MLTRL 5→6**: From prototype to production-grade code – the engineering handover
- **MLTRL 7→8**: From deployed to monitored – the operational maturity leap

## Why It Matters

Most AI failures occur at transition points. MLTRL makes these gates explicit, auditable, and governed – preventing silent regressions from reaching end-users.



# Security, Governance & Operations Dimensions

TRL and MLTRL answer: *"Is the technology ready?"* These three new asset-centric dimensions answer the questions that actually determine production deployability.

## SecRL — Security Readiness

Inspired by the MultiRATE project and emerging AISPM (AI Security Posture Management) practices. Covers adversarial robustness, prompt injection defense, model inversion resistance, and automated red-teaming maturity.

## GovRL — Governance Readiness

Asset-centric interpretation of NIST AI RMF and ISO/IEC 42001. Tracks ownership assignment, AI-BOM completeness, regulatory classification, and automated compliance reporting capability.

## OpsRL — Operations Readiness

MLOps maturity meets operational assurance. Covers environment reproducibility, CI/CD integration, canary/shadow deployment, observability pipelines, and incident response playbooks.

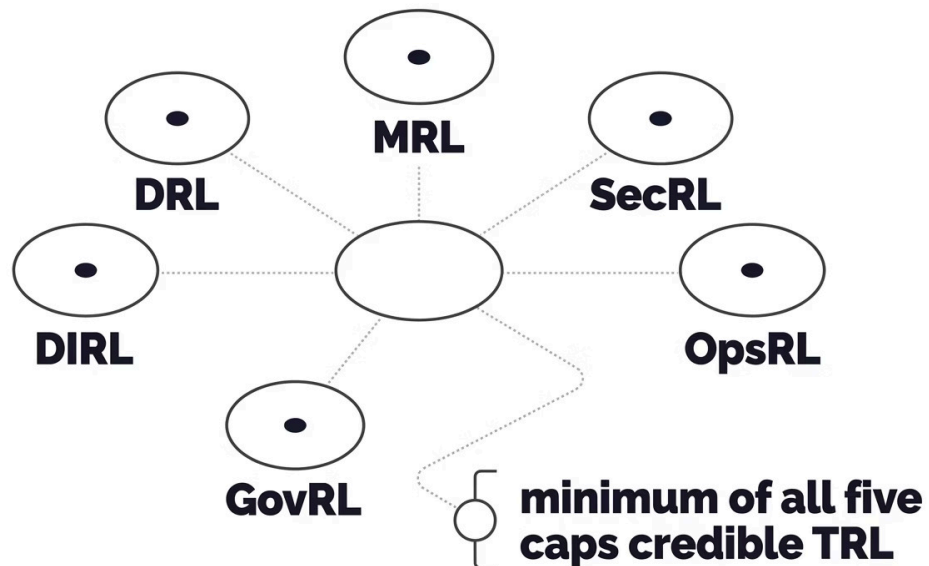
# The AIA-RL Framework

**AI Asset Readiness Levels** – 5 dimensions combined into one governance-grade composite score that directly constrains your credible TRL ceiling.

## The Formula

- 📄 **AIA-RL = min(DRL, MRL, SecRL, GovRL, OpsRL)**  
The weakest dimension caps the entire system's credible readiness level.

This is not an average – it is a **minimum**. A system with DRL 5, MRL 5, SecRL 5, GovRL 1, and OpsRL 4 has an AIA-RL\_min of 1. No amount of technical excellence compensates for ungoverned assets.



## AIA-RL\_min → Maximum Credible TRL

AIA-RL_min	TRL Max
1	TRL 3
2	TRL 5
3	TRL 7
4	TRL 8
5	TRL 9 ✓

This mapping is the core governance mechanism: it prevents over-reporting of system readiness while providing a clear upgrade path.

# AIA-RL in Detail — Data & Model Maturity

The first two dimensions of AIA-RL — **DRL** and **MRL** — condense Lawrence's and Lavin's frameworks into five actionable, comparable rungs per asset type.

## DRL — Data Readiness

01

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Hypothetical / inaccessible data

No pipeline, no schema, no access agreement.

02

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Accessible but raw

Retrievable, requires heavy manual cleaning.

03

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Versioned pipeline, basic quality

Reproducible preprocessing, basic metrics.

04

---

Feature store, automated tests

Cross-project reuse, data-as-a-product.

05

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Auditable, GDPR/AI Act certified

Code-like versioning, continuous compliance.

## MRL — Model Readiness

01

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Idea / single notebook

Informal experiment, no reproducibility.

02

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Versioned research code

Reproducible runs, documented hyperparameters.

03

---

Complete model card + handover

Structured documentation, capability transfer.

04

---

Registry, semantic versioning, clean API

Production-grade interface, staging validated.

05

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Catalogued, benchmarked, monitored

Full production loop with drift detection.

# AIA-RL in Detail — Security, Governance & Ops

The three new asset-centric dimensions that transform AIA-RL from a technology framework into a **full-spectrum production readiness instrument**.

## SecRL — Security

- **1:** Classic software security treatment only
- **2:** Manual adversarial input testing
- **3:** Structured red-teaming, basic AISPM
- **4:** Automated adversarial pipeline, ISO A.8
- **5:** Full AISPM, continuous bug bounty, certified

## GovRL — Governance

- **1:** No owner, no documentation
- **2:** Named owner, basic risk register
- **3:** AI-BOM drafted, regulatory classification
- **4:** Full AI-BOM, cross-functional sign-off
- **5:** Automated regulatory reporting, certified

## OpsRL — Operations

- **1:** Manual, single-machine deployment
- **2:** Scripted deployment, basic logging
- **3:** CI/CD pipeline, environment parity
- **4:** Canary/shadow mode, alerting
- **5:** Full observability, incident playbooks

# AIA-RL\_min → Credible TRL Mapping

No more **"We are TRL 7 – but it explodes in production."** The mapping table below transforms subjective claims into a governed, bottleneck-visible readiness score.

AIA-RL_min	TRL Max	Interpretation
1	TRL 3	Proof-of-concept only. Not deployable.
2	TRL 5	Prototype validated. Controlled demo possible.
3	TRL 7	Pilot-ready. Deployment in limited production.
4	TRL 8	Qualified system. Near-full operational deployment.
5	TRL 9	Fully operational. Audit-ready. Regulation-compliant.

## Practical Benefit

The mapping immediately surfaces **which dimension** – data, model, security, governance, or ops – is the bottleneck. This translates directly into a prioritized remediation roadmap:

- **6-month horizon:** Unblock the lowest-scoring dimension
- **12-month horizon:** Reach AIA-RL\_min 3 on critical systems
- **24-month horizon:** AIA-RL\_min 4–5 on regulated, high-value assets

Asset maturity converts governance ambiguity into a **single actionable number** – and a clear path forward.

# Practical Scenarios & Realistic Costs

Adopting AIA-RL does not require a full enterprise transformation on day one. Three adoption scenarios accommodate different organizational scales, risk appetites, and regulatory obligations.

1

Essential — Medium Organization

**Scope:** AIA-RL 2–3 on key systems

**Investment:** 150–400 k€/yr · 0.5–1 FTE

Establish baseline scoring, data and model maturity assessments, basic governance ownership. Ideal for organizations beginning their AI Act compliance journey.

2

Core — Advanced Business Unit

**Scope:** AIA-RL\_min 3 on critical systems

**Investment:** 400 k–1.2 M€/yr · 2–3 FTE

Integrate AIA-RL into project gates, architecture reviews, and risk committees. Enables credible TRL 7 claims on production systems.

3

Extended — Large Regulated Group

**Scope:** AIA-RL 3–4 across hundreds of assets

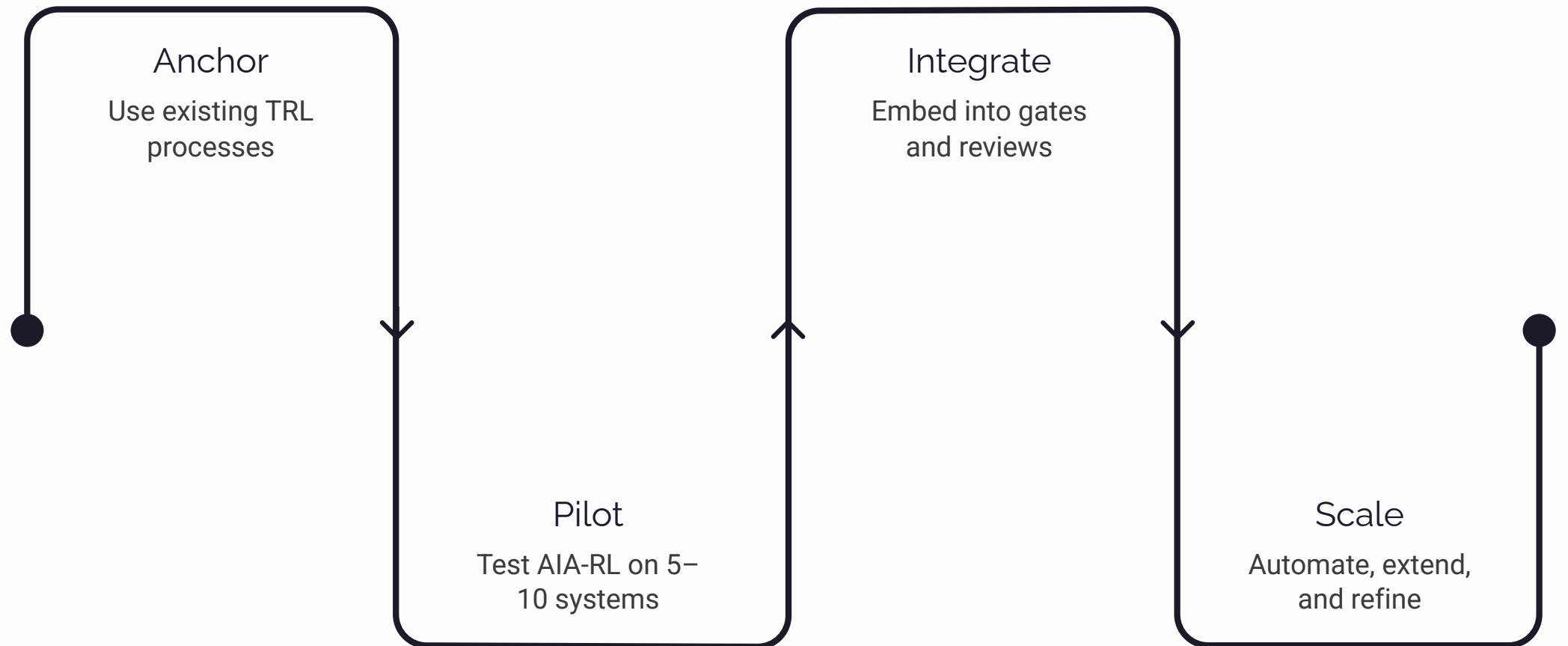
**Investment:** 1–3 M€/yr · 3–5 core FTE + 10–15 contributors

Full automation, regulatory reporting, AI-BOM catalog, and cross-BU reuse. First-year ISO 42001 + AI Act alignment typically falls in this range.

❏ **Key Insight:** The cost of *not* measuring asset maturity — incidents, regulatory fines, failed audits, wasted POC cycles — consistently exceeds these investment figures.

# Adoption Roadmap

From insight to embedded practice in **four sequential steps** – each building on the last, designed to minimize disruption while maximizing governance uplift.



Each step is designed to deliver standalone value – organizations can pause and consolidate at any stage while still achieving meaningful governance improvements.

## → Start Where You Are

Anchor on your existing TRL vocabulary. AIA-RL augments – it does not replace – your current stage-gate processes.

## → Prove It on a Pilot

Select 5–10 systems spanning different risk levels. Complete radar scoring and a dimension matrix. The gaps will speak for themselves.

## → Embed into Governance

Integrate AIA-RL scores into project gates, risk reviews, and architecture decision records. Make the shared language operational.

## → Scale & Automate

Extend to the full asset portfolio, automate scoring pipelines, and continuously refine thresholds as regulatory standards evolve.

# The Core Message

## Focus efforts where value and risk justify it.

AI asset maturity gives every stakeholder – from the engineer to the board – a **clear, honest view of the real foundation** under every AI system in the organization.

### Create a Shared Language

Business, tech, risk, legal, and leadership aligned on one readiness vocabulary – no more translation loss between teams.

### Surface the Real Bottleneck

AIA-RL\_min instantly identifies which dimension is limiting your credible TRL – and by how much. No more hiding weak foundations behind strong demos.

### Govern With Confidence

Give leaders and regulators a traceable, auditable record of what each AI system rests on – and a credible roadmap to the next maturity level.

LEGO V – AI ASSET MATURITY

FULL ARTICLE AVAILABLE ON REQUEST