

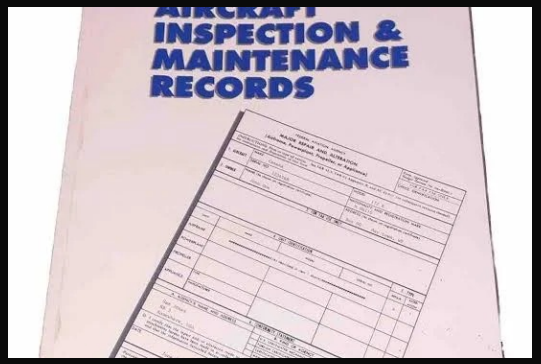
Legacy Systems in the Agentic AI Era

Keep the Record. Modernize the Work.

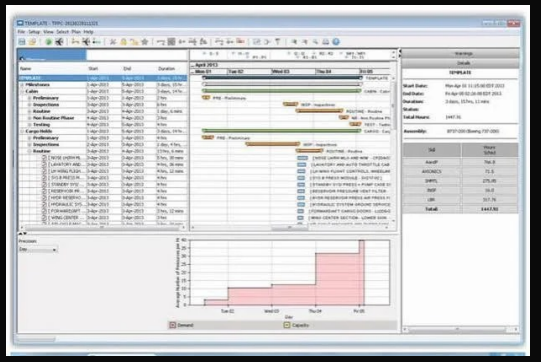
Brian Lampert
LEGION INTELLIGENCE

Paper. Legacy systems. Cloud. AI.

All at once.



01 PAPER AND MANUAL



02 LEGACY MISSION SYSTEM



03 CLOUD

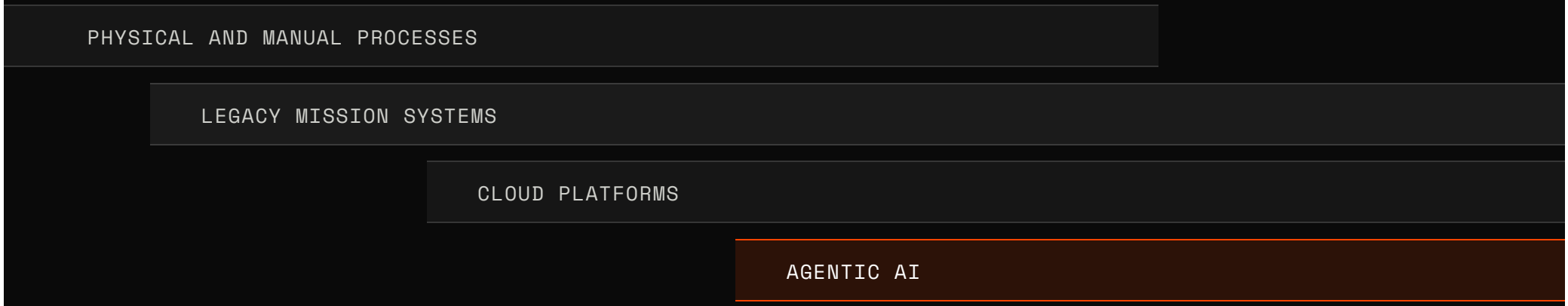


04 EDGE AND AI

ACT I — MODERNIZATION IS ALREADY HYBRID

Modernization is not a clean cutover.

New capability arrives faster than old capability retires.



Keep the Record.
Modernize the Work.

Legacy is a condition, not a birthday.

30 years old

Reliable

Authoritative

Accessible

OLD, BUT USEFUL

2 years old

Isolated

Brittle

Hard to change

NEW, BUT ALREADY LEGACY

Three debts. One mission tax.

Technical debt

Code

Infrastructure

Interfaces

Semantic debt

Identity

Meaning

Context

Workflow debt

Handoffs

Workarounds

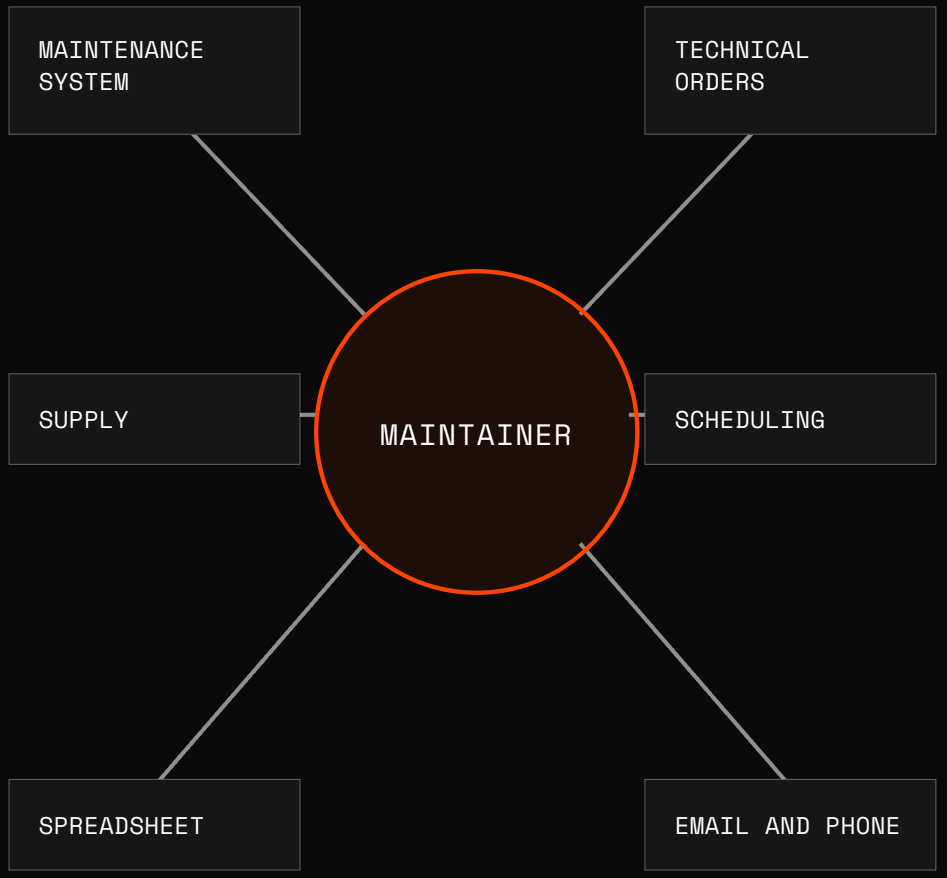
Human memory

↓ ↓ ↓

TIME, ATTENTION, AND READINESS LOST

The most expensive middleware is a human.

SEARCH
COPY
ROUTE
RECONCILE
REFORMAT
RE-ENTER



AI changes what we modernize first.

AROUND THE SYSTEM

- Integrate
- Orchestrate
- Reframe the experience

SYSTEM A | SYSTEM B | SYSTEM C

INSIDE THE SYSTEM

- Understand
- Test
- Expose
- Refactor

```
SUBROUTINE MAINT_STAT CALL LEGACY_LOOKUP(ACFT_ID) IF STATUS
.EQ. 'OPEN' THEN
```

IMMEDIATE WORKFLOW VALUE → PROGRESSIVE SYSTEM MODERNIZATION

Maintenance is the workflow. Readiness is the outcome.





Intermittent fault
Mission in six hours
The answer is distributed

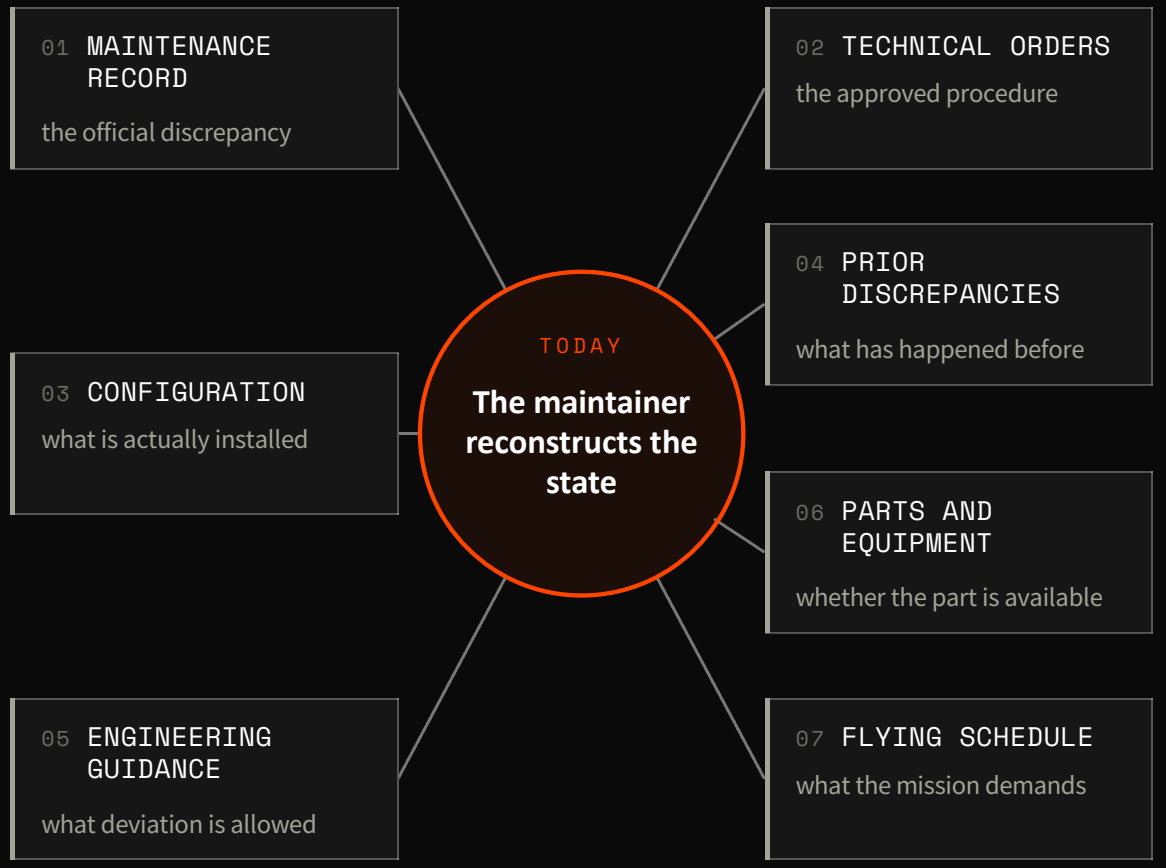
DISCREPANCY

Intermittent system fault

CURRENT STATUS	OPEN
NEXT MISSION	6 HOURS

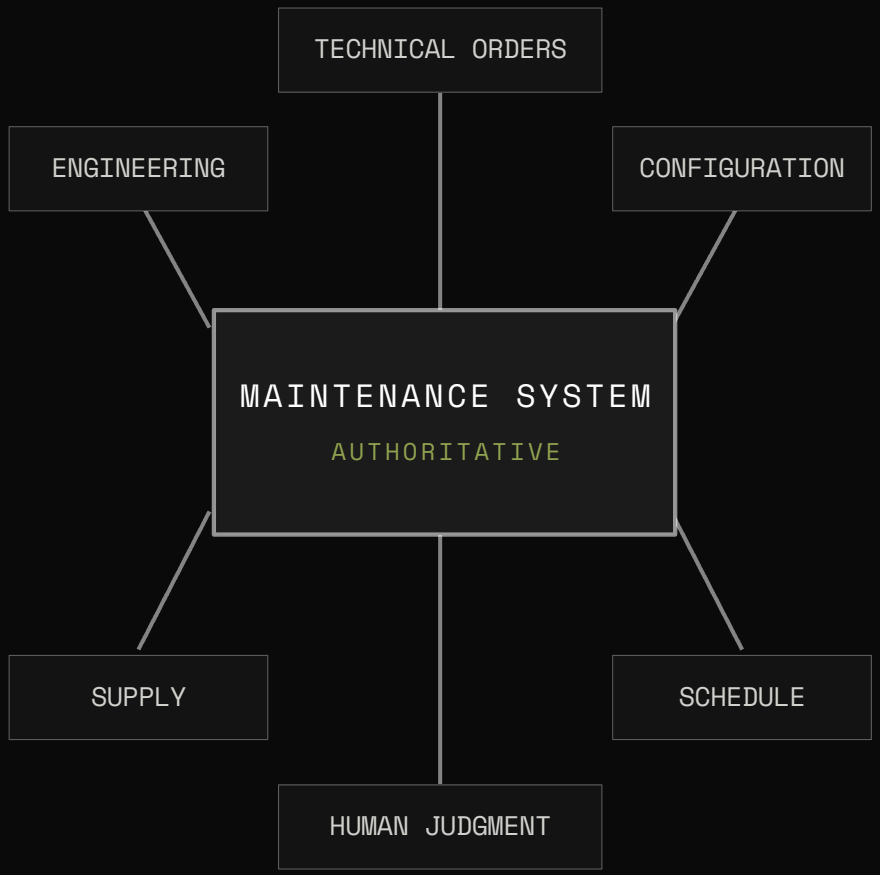
One problem. Seven partial views.

Not primarily a model problem. A coordination problem.



The official discrepancy is one part of the decision.

The system of record tells us what is official. The workflow also depends on technical authority, configuration, supply, schedule, local conditions, and human judgment.

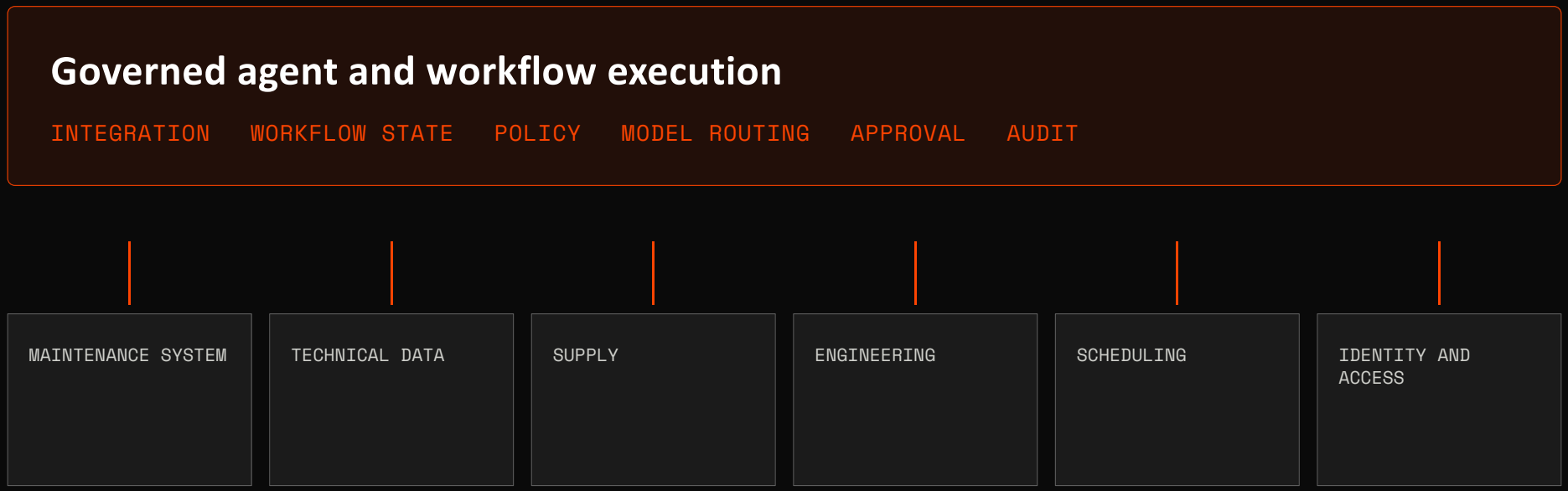


Keep authoritative systems authoritative.

AUTHORITATIVE

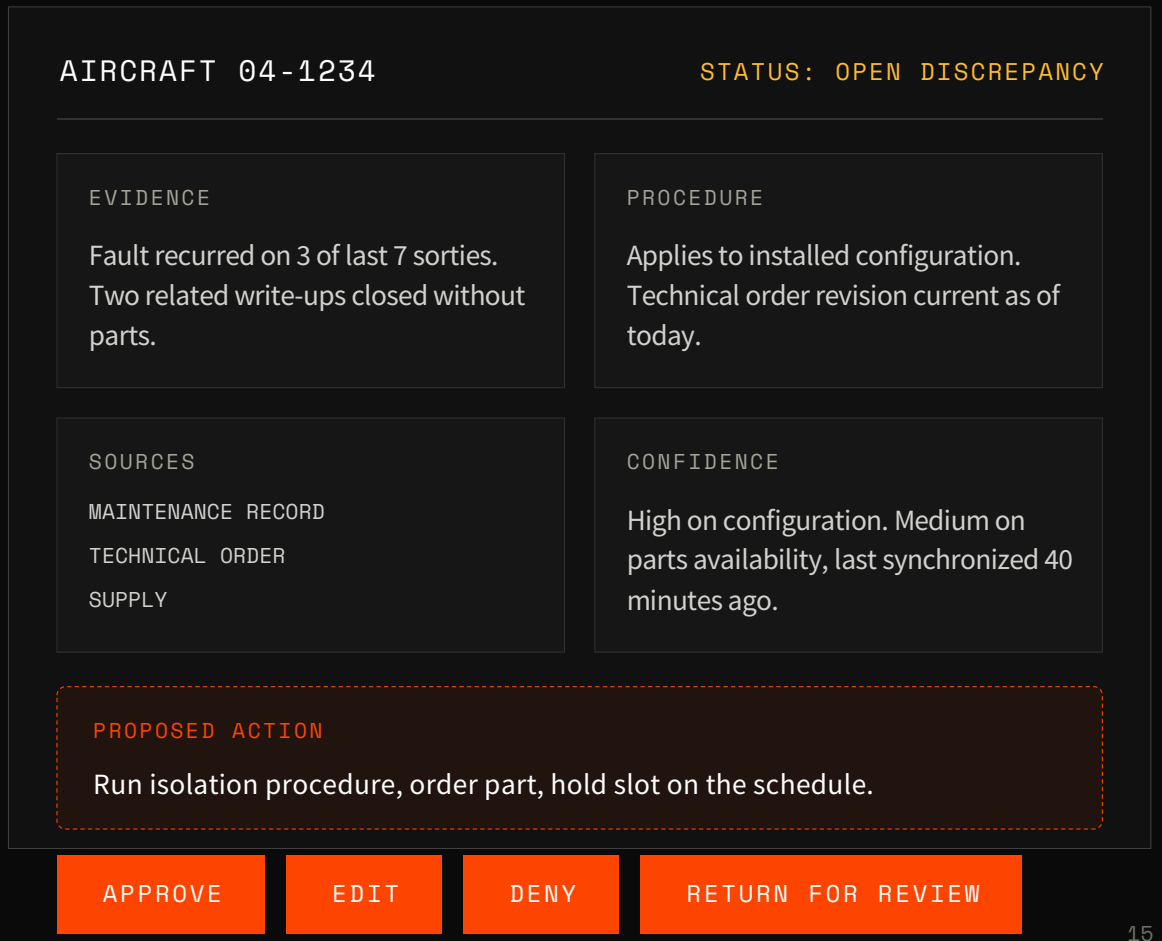
Identity	Discrepancy	Configuration
Corrective action	Sign-off	Status

Add a governed execution layer.

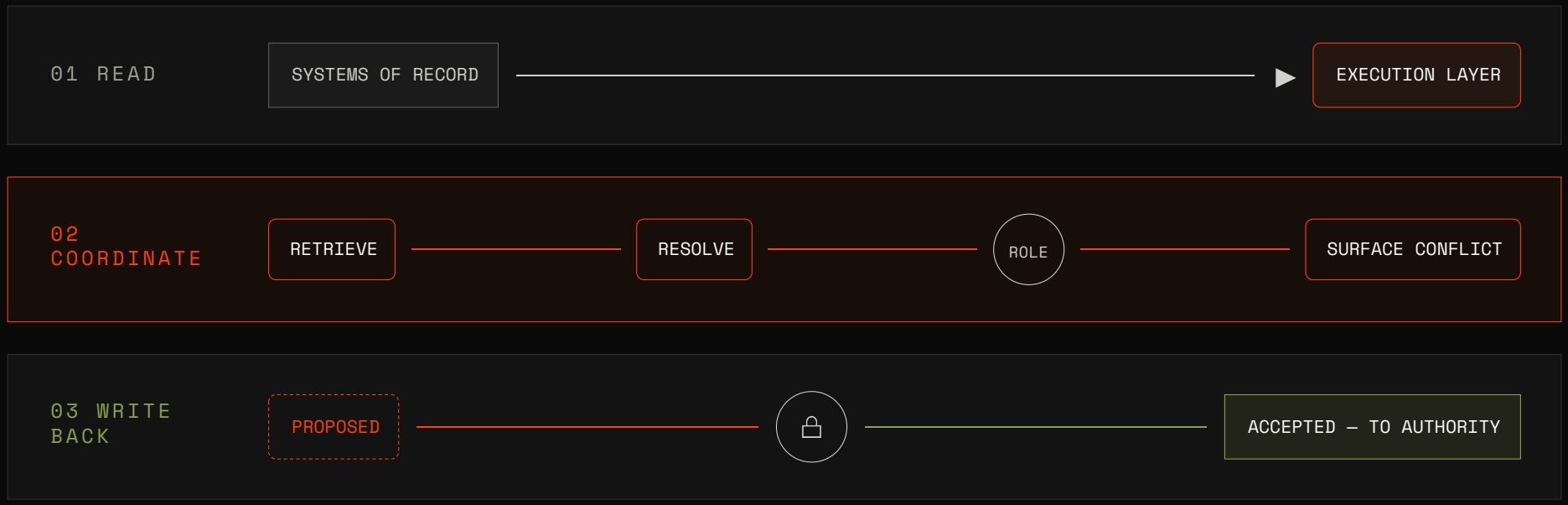


Give the maintainer one mission-aware view.

- Discrepancy
- Applicable procedure
- Aircraft configuration
- Relevant prior events
- Parts and equipment
- Recommended next step
- Readiness impact
- Sources and confidence



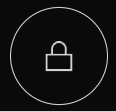
Read across. Coordinate the work. Write back.



Proposed is not accepted.

PROPOSED

Draft corrective action, evidence attached



APPROVAL

ACCEPTED

Recorded by the authoritative system, attributed

NOT THIS

~~A new AI database as a second source of record~~

Coordinate working state.

Return approved state to the authority.

ACT III — MAINTENANCE AND READINESS

Create a modernization seam.

EXPERIENCE

Mission experience

↓

THE SEAM

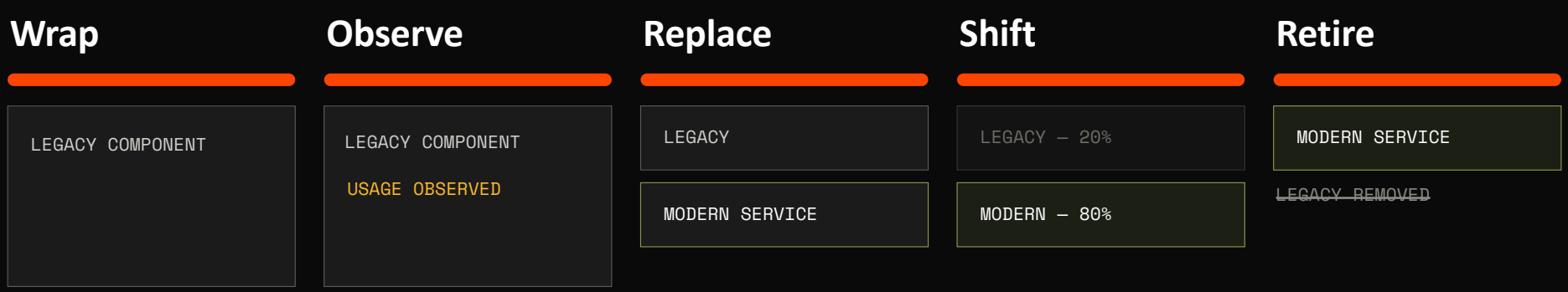
Stable workflow and integration contract

↓

LEGACY SERVICES AND REPOSITORIES

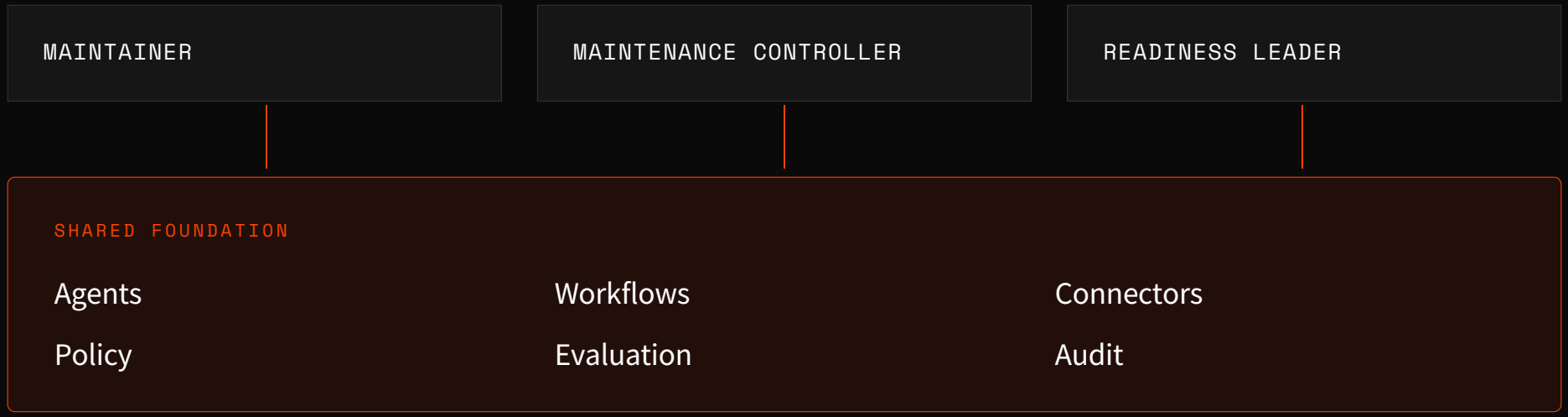
Changing implementation

Refactor behind the contract.



Retire on mission evidence, not the program schedule alone.

Role-specific experience built on a shared governed foundation



Tailor the experience. Share the execution foundation.

A copilot helps one maintainer. Readiness is a team outcome.

ONE MAINTAINER



PRIVATE AI SESSION

Search

Summarize

Draft

ONE MAINTENANCE ACTION

MAINTENANCE ACTION 04-1234

Maintenance

Engineering

Leadership

Supply

Operations

The unit of work is the maintenance action.



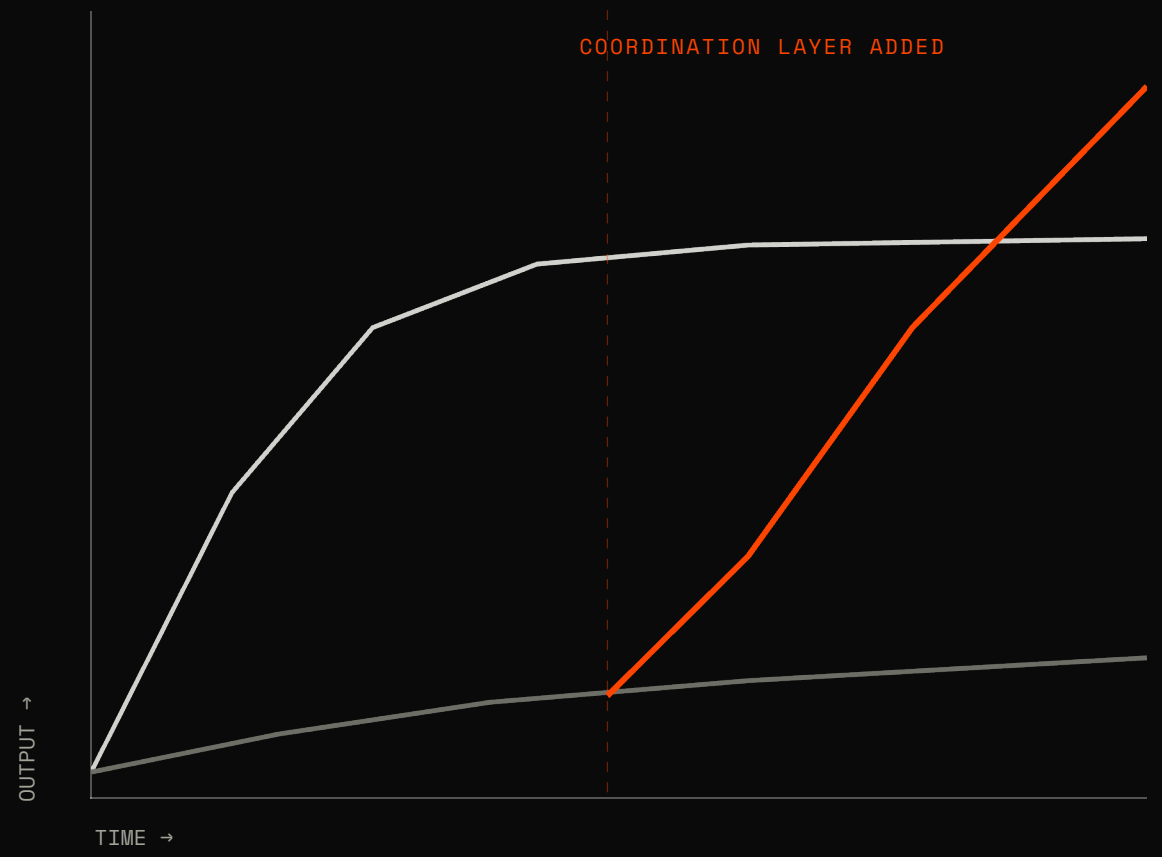
Survives shift changes. Preserves attribution. Carries its sources. Ends in an authorized decision.

Individual productivity rises quickly.

Organizational output does not.

- Individual productivity, single-player AI
- Organizational output, single-player AI
- Organizational output with a coordination layer

ILLUSTRATIVE



Catch the contradiction while the work is forming.

PERIODIC

COLLECT → RECONCILE → BRIEF

MAINTENANCE — OK

SUPPLY — OK

ENGINEERING — OK

OPERATIONS — OK

↓

CONTRADICTION DISCOVERED AT THE BRIEFING

CONTINUOUS

MAINTAIN → DETECT → ESCALATE

AGENTS MAINTAIN SHARED STATE

DEPENDENCY MONITORED

CONFLICT SURFACED — HOUR 1

ESCALATED TO A PERSON

Do not wait until the briefing to discover the conflict.

Stable semantics are a control.

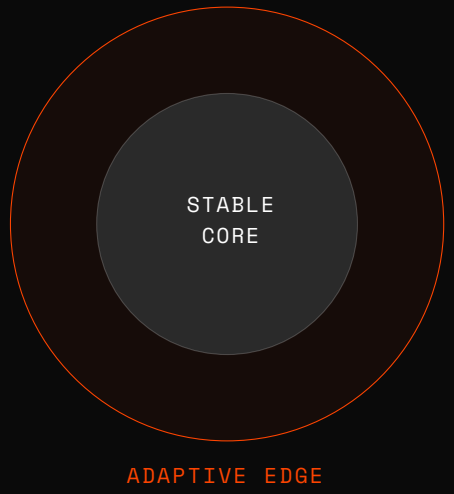
Identity	Status	Authority	Transaction	Standard

The question is what must remain stable and what should adapt.

Stable core. Adaptive semantic edge.

STABLE CORE

- Aircraft identity
- Part number
- Fault code
- Configuration baseline
- Technical-order version
- Personnel authority
- Official status

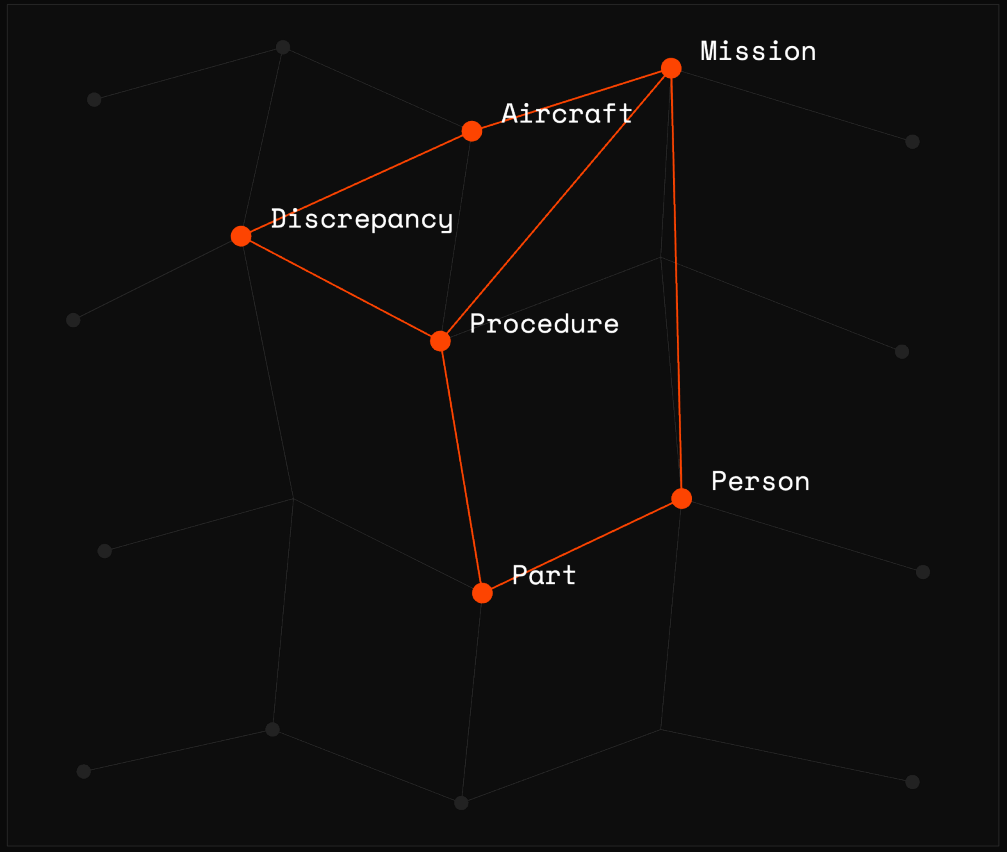


ADAPTIVE SEMANTIC EDGE

- Mission priority
- Local terminology
- Relevant prior failures
- Current constraints
- Likely relationships
- Derived state
- Confidence

Source-linked, typed, permission-aware, versioned, explicit about confidence.

You do not need the perfect enterprise model to improve one workflow.



Start with the workflow.

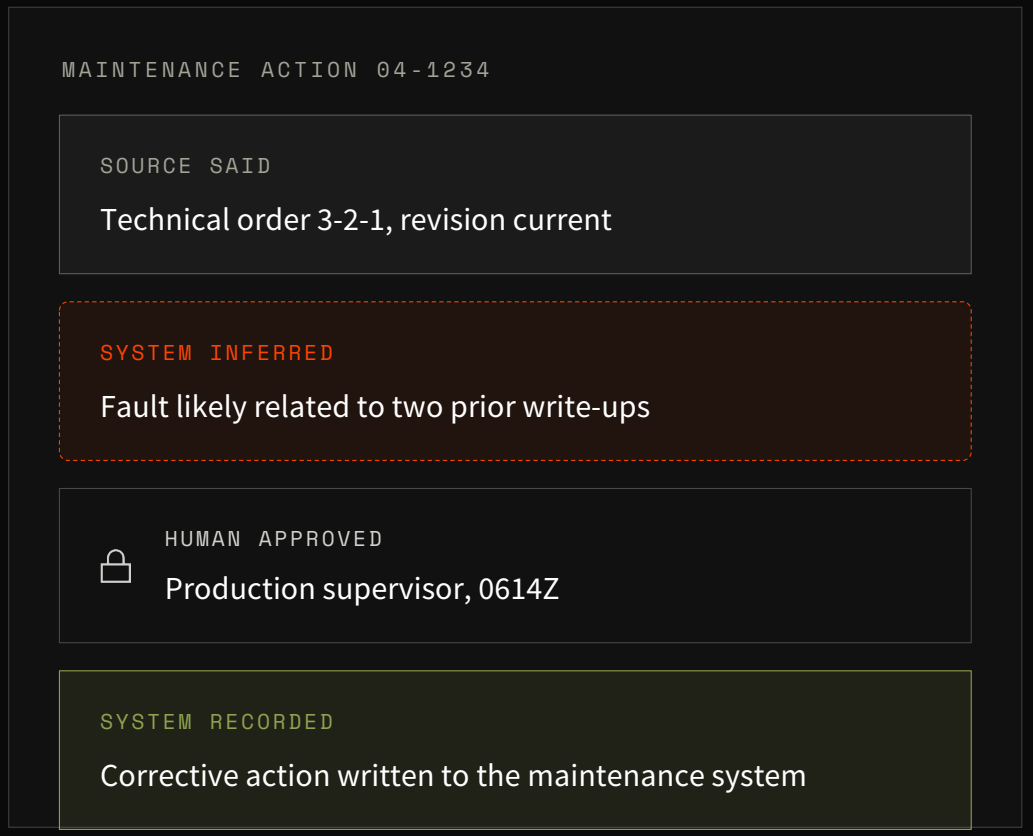
Model the relationships it needs.

Preserve source meaning.

Expand when the evidence earns it.

Provenance is the contract.

Provenance does not prove correctness. It makes the work inspectable and the decision accountable.



Cloud is essential.

A difficult maintenance problem may benefit from a frontier model reasoning across more technical and historical data than a small local system can hold.

01

Frontier models

02

Elastic compute

03

Fleet-scale analysis

04

Evaluation

05

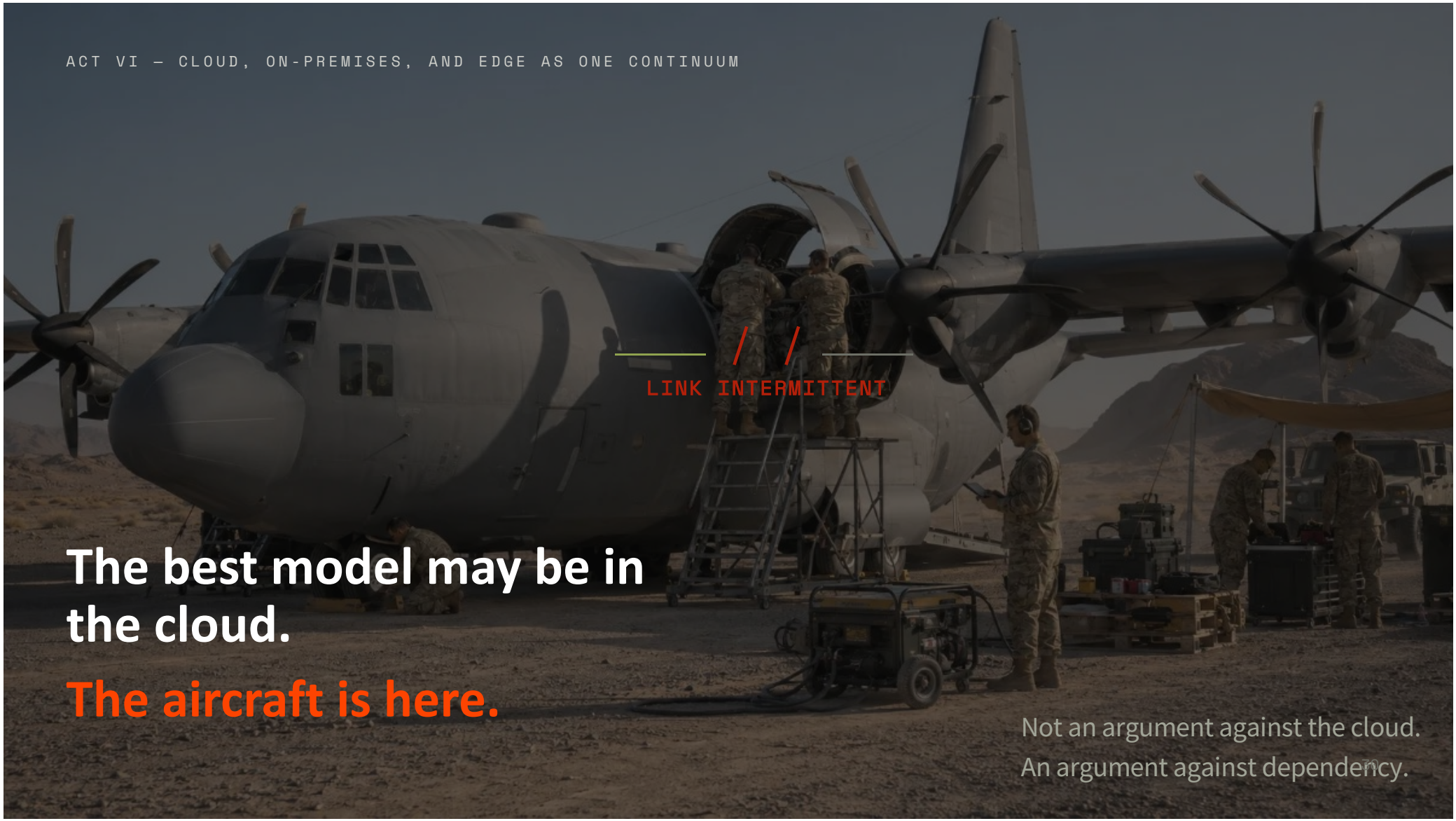
Enterprise synchronization

06

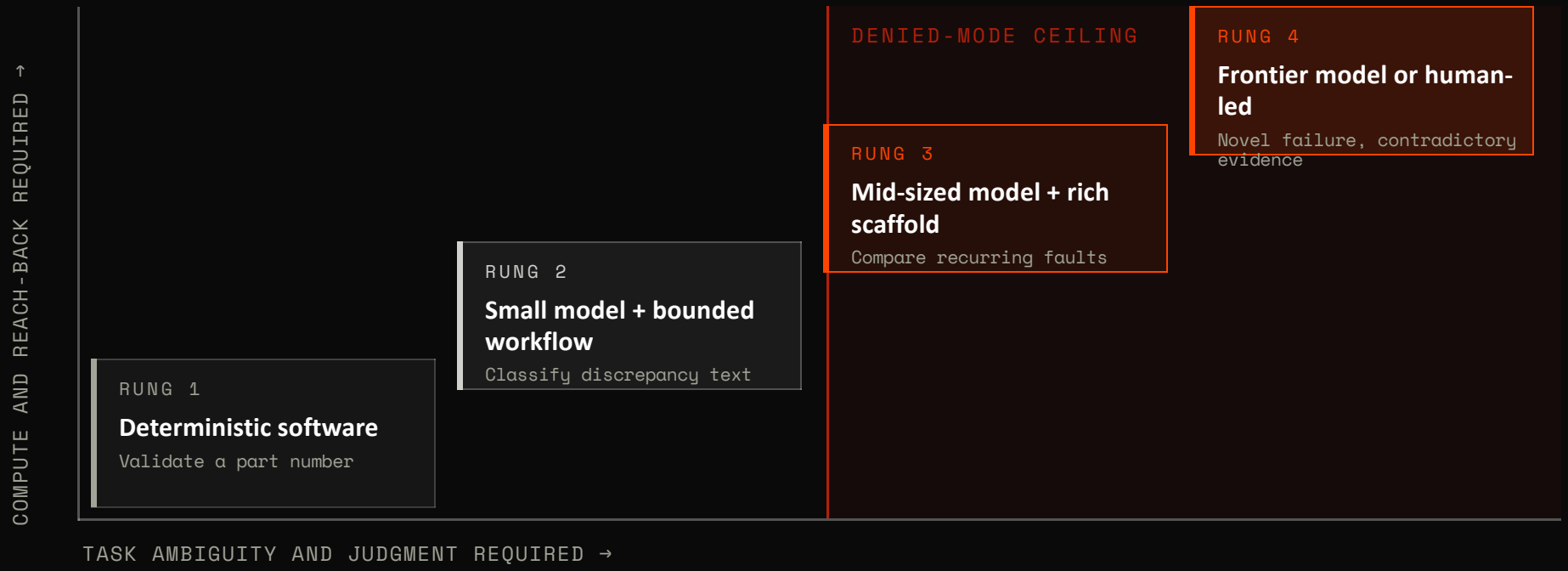
Central management

An accelerator, not a prerequisite for every useful action.

WHEN AVAILABLE


ACT VI — CLOUD, ON-PREMISES, AND EDGE AS ONE CONTINUUM
LINK INTERMITTENT
The best model may be in the cloud.
The aircraft is here.
Not an argument against the cloud.
An argument against dependency.

Task ambiguity sets the compute bill.



Tasks survive disconnection when the required compute fits locally, or when their ambiguity has been reduced in advance.

Use the smallest sufficient model.

Required-field validation	RULES
Fault-text classification	SMALL LOCAL MODEL
Procedure retrieval	SMALL LOCAL MODEL
Recurring-fault comparison	MID-SIZED MODEL
Novel diagnosis	FRONTIER MODEL
Airworthiness decision	HUMAN EXPERT

Capability is the model, the harness, and the context together.

Connected. Degraded. Denied.

CONNECTED

Frontier models

Live enterprise state

Immediate synchronization

DEGRADED

Local context

Smaller models

Queued transactions

DENIED

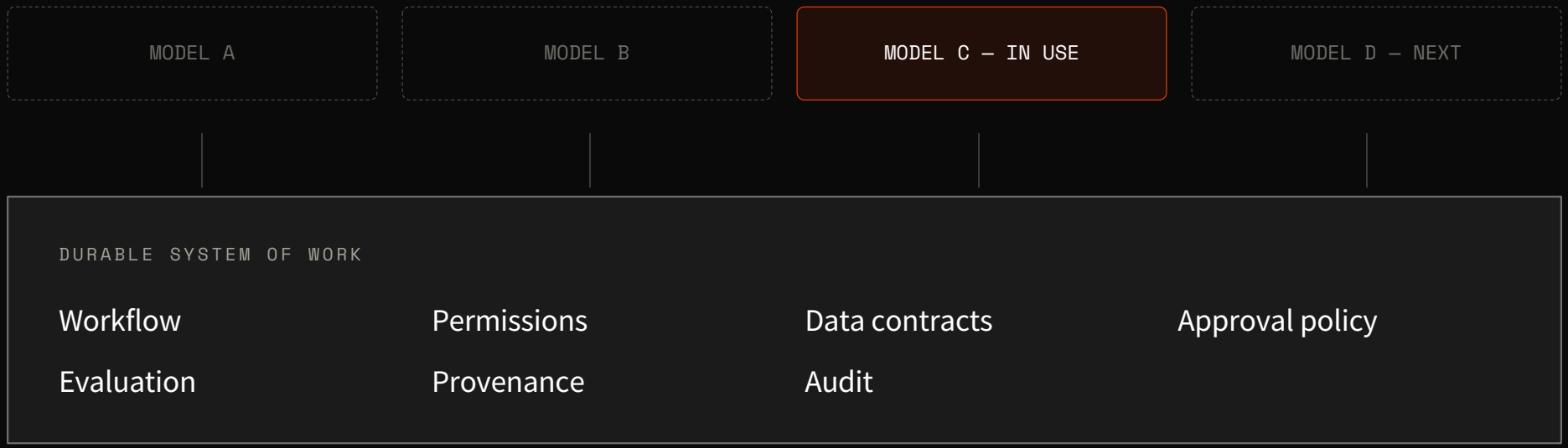
Bounded local workflow

Explicit limits

No silent conflict resolution

RECONNECTED Compare, adjudicate, synchronize

Models change.
The decision record remains.



Reading is a data problem. Releasing an aircraft is an authority problem.

READ

Access and context

Retrieve and draft. Nothing official changes.

- MAINTENANCE SYSTEM
- TECHNICAL DATA
- SUPPLY
- SCHEDULING

ACT

Authority and accountability

One controlled transaction, through a person, before official status changes.

PROPOSED TRANSACTION

REQUIRED AUTHORITY

OFFICIAL STATUS CHANGED

Governance is the maintenance workflow, not the prompt.



> **If everything is a prompt, anything can become a command.**

```
propose_maintenance_action(
aircraft_id,
discrepancy_id,
procedure_id,
evidence,
proposed_action,
confidence
)
```

Humans in, on, or out of the loop.

Human out ROUTINE · REVERSIBLE · BOUNDED	Normalize fields · Retrieve procedures · Check completeness
Human on MONITORED · EXCEPTION-DRIVEN · RECOVERABLE	Monitor parts status · Detect exceptions · Route routine work
Human in CONSEQUENTIAL · AMBIGUOUS · AUTHORITATIVE	Approve authoritative record changes
Human-led AIRWORTHINESS · RISK ACCEPTANCE · RELEASE	Determine airworthiness · Accept risk · Release aircraft

Trust is measurable.

Time

Time to useful action

Reconciliation conflicts

Correctness

Reviewer correction rate

Provenance completeness

Control

Write-back exceptions

Escalation quality

> Is checking the agent's answer against its linked evidence cheaper than deriving the answer manually?

ACT VIII — PROGRESSIVE MODERNIZATION

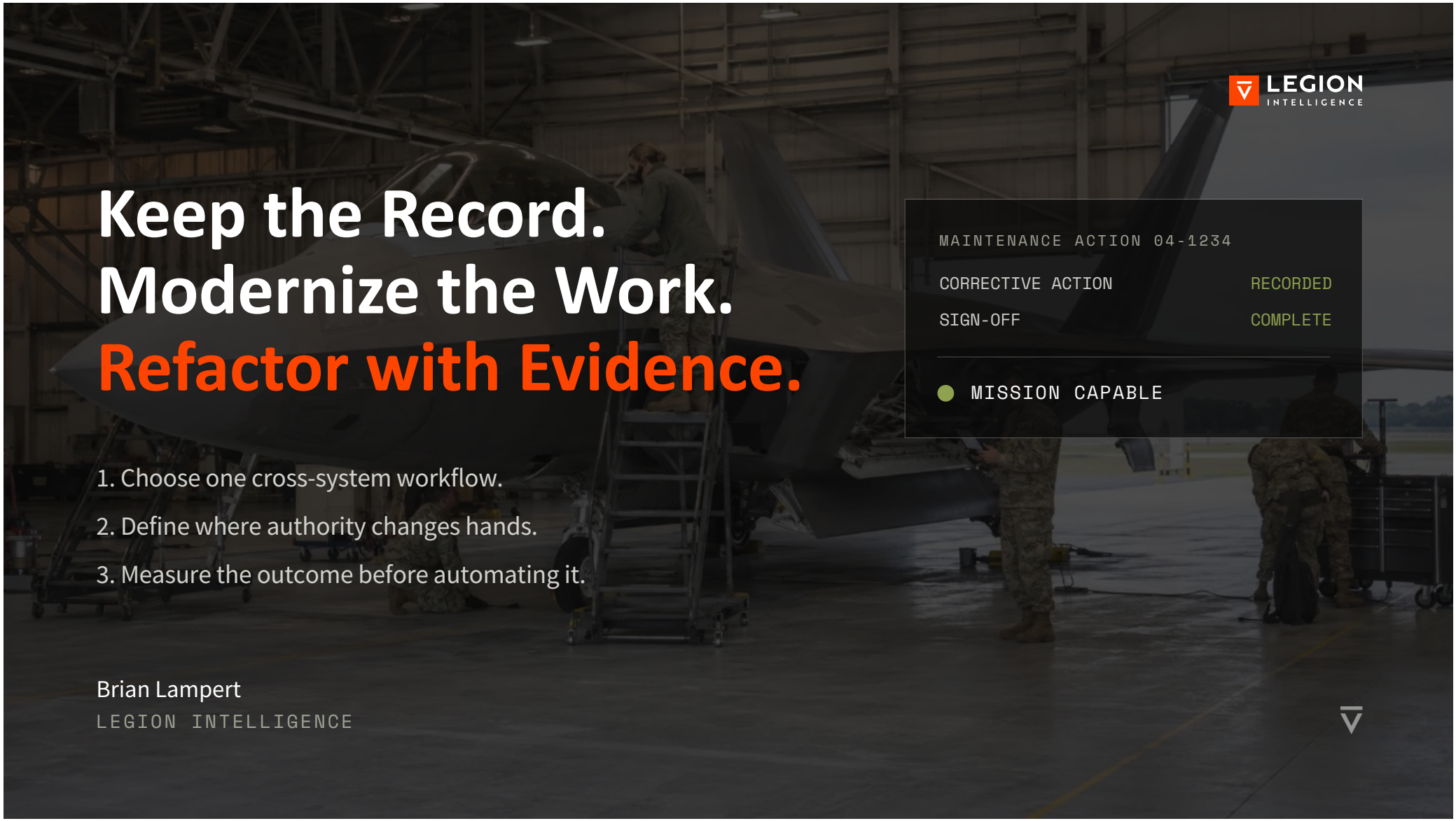
Progressive modernization, not permanent wrapping.

1	**Overlay**	Establish controlled access to the existing environment
2	**Observe**	Map the real workflow, exceptions, and data-quality problems
3	**Assist**	Retrieve, reconcile, summarize, and draft without changing authoritative state
4	**Approve**	Introduce proposed transactions that authorized people review
5	**Automate**	Automate bounded, measurable, and reversible workflow segments
6	**Refactor**	Replace the underlying components revealed as the largest constraints
7	**Retire**	Remove the old capability when mission evidence shows the replacement is ready

WARNING SIGNS

SCREEN SCRAPING SHADOW STATE HIDDEN PROMPT LOGIC NO EVALUATION NO EXIT PATH SILENT CONFLICT RESOLUTION

The AI layer should make the architecture more observable, not become its newest technical debt.



Keep the Record. Modernize the Work. Refactor with Evidence.

1. Choose one cross-system workflow.
2. Define where authority changes hands.
3. Measure the outcome before automating it.

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