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Integrated Asset Integrity Management for HSSE, Sustainability, and Operational Excellence

28–29 APRIL 2026 | BANGKOK, THAILAND



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Integrated Asset Integrity Management for HSSE, Sustainability, and Operational Excellence



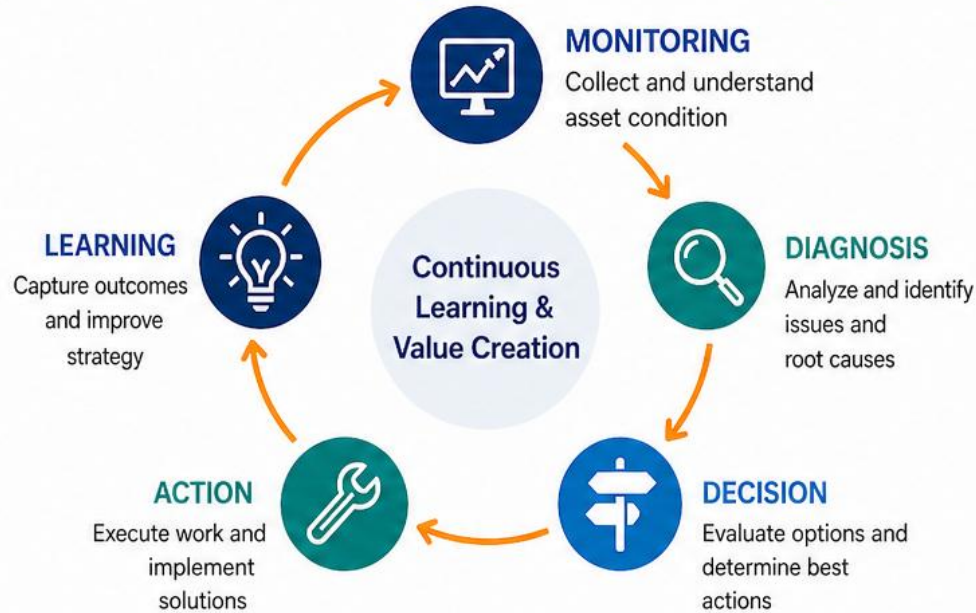
Driving Sustained Operational Readiness: From Data to Decisions in Asset Integrity Management

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Context Setting for Asset Integrity Management

How Asset Integrity Works (Closed Loop)



What It Enables



DEFINITION (SIMPLIFIED)

Ensuring assets operate safely, reliably, and optimally across their lifecycle, *while managing risk and maximizing availability.*

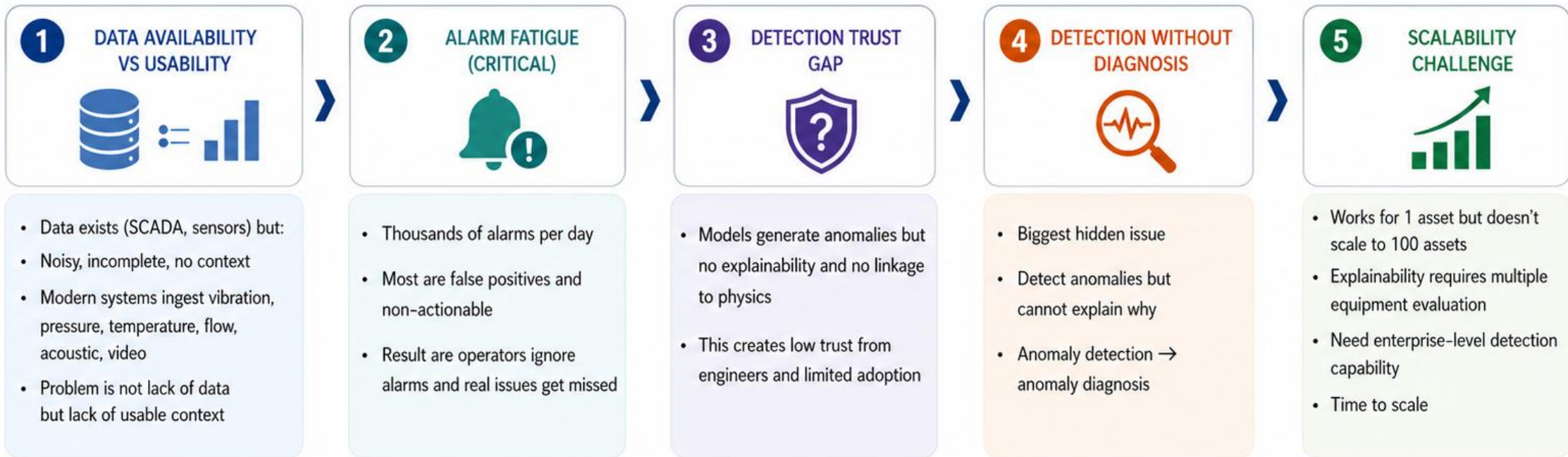


KEY TAKEAWAY

Asset Integrity is not monitoring, it is the ability to take the right action at the right time, consistently across assets.

Common Challenges in Achieving the Objectives

Part 1: Analysis



THE IMPACT

Siloed data, overwhelming alarms, and limited explainability prevent organizations from making confident decisions, leading to downtime, lost production, and increased risk.

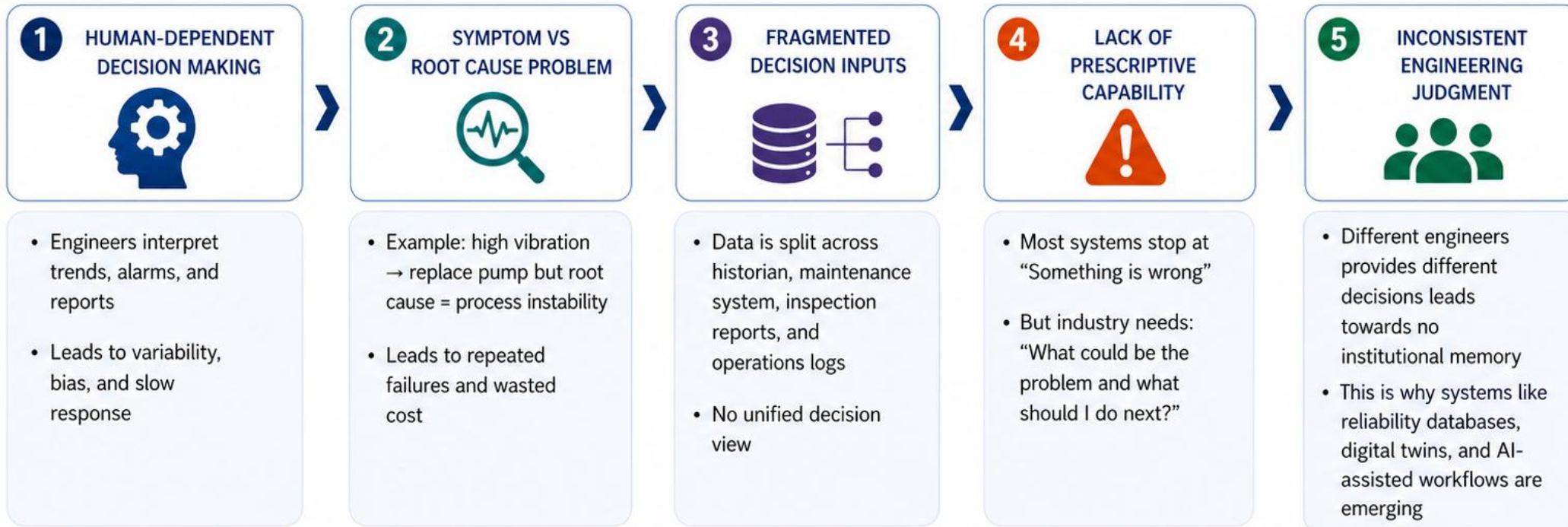


THE NEED

An end-to-end, context-rich, explainable approach that builds trust, delivers diagnosis, and scales across the enterprise.

Common Challenges in Achieving the Objectives

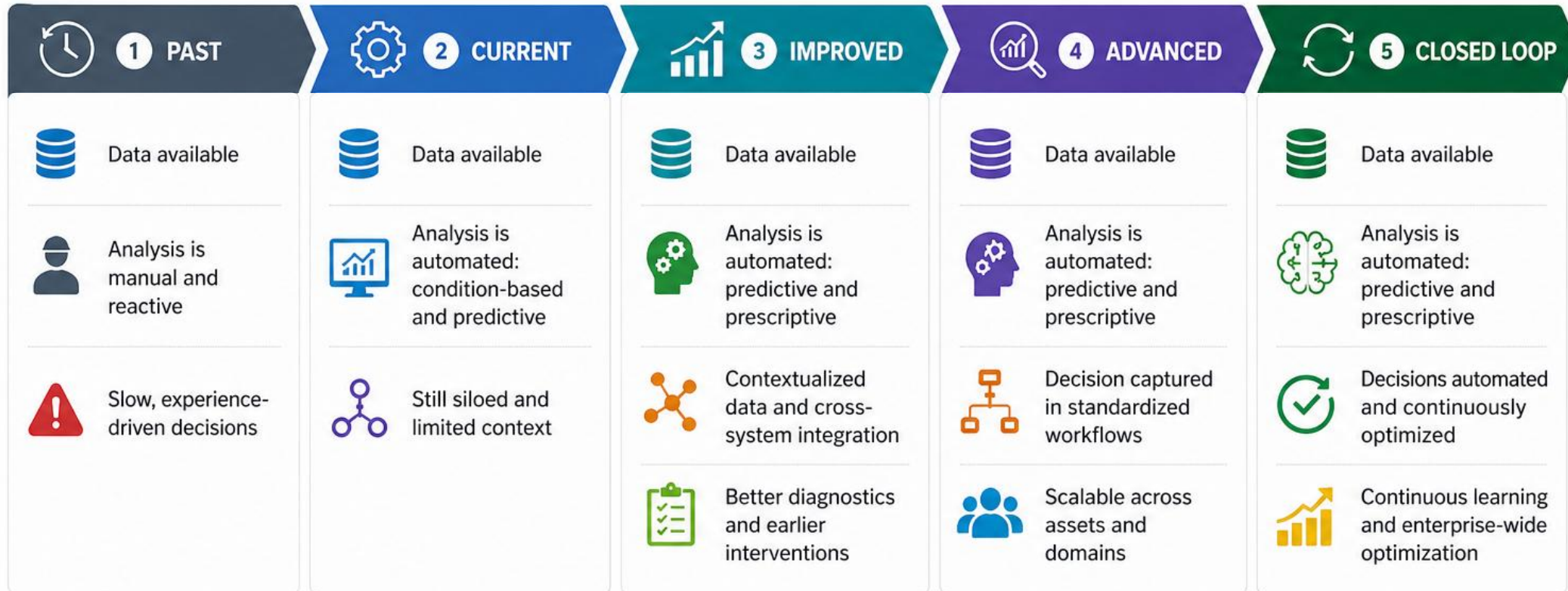
Part 2: Action



THE IMPACT | Reactive decisions, repeated failures, and inconsistent actions lead to higher risk, lower reliability, and lost production.

THE NEED | From manual and fragmented to **automated, proactive,** and **prescriptive** decisions that drive consistent actions and better outcomes.

Evolution of Asset Integrity Management

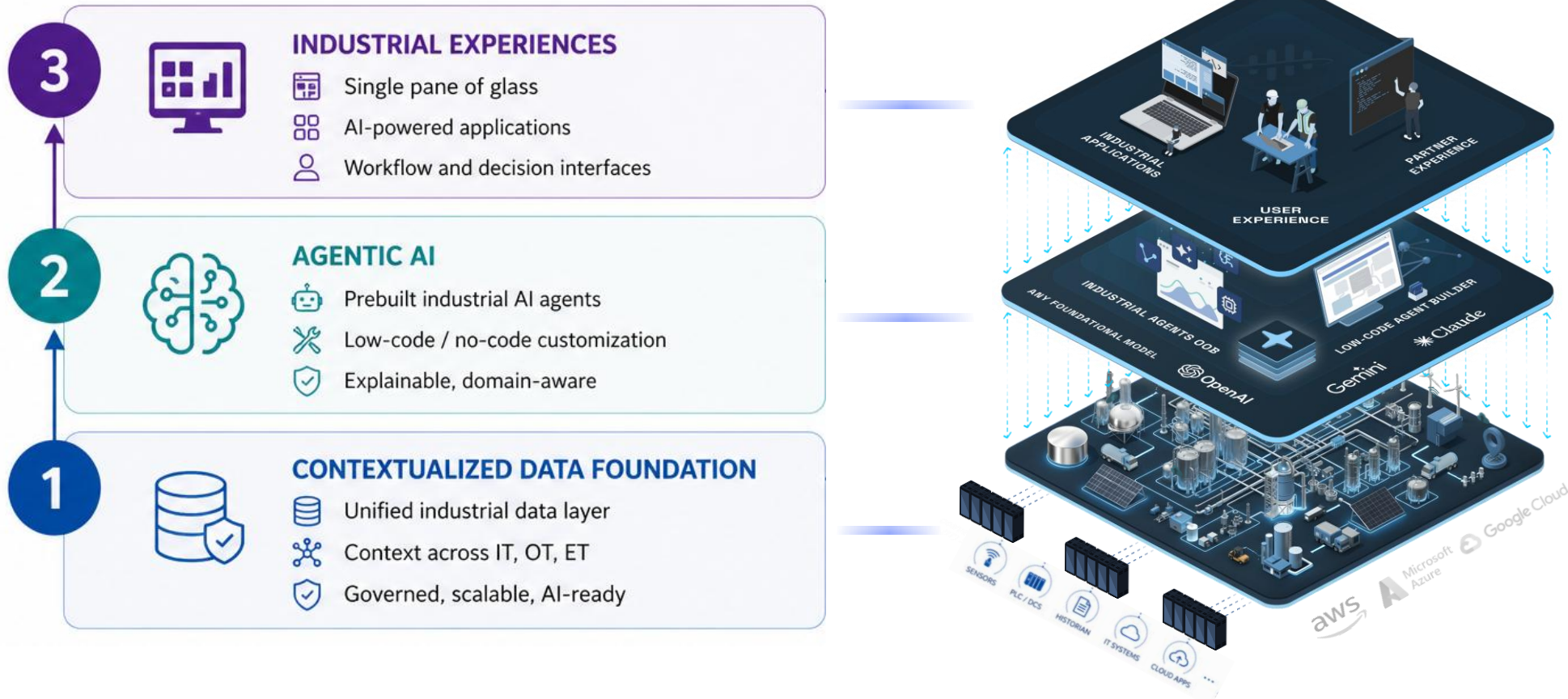


KEY TAKEAWAY

Most organizations are stuck between “Current” and “Improved”.

Reaching Closed Loop requires an operating system that connects data, context, and decisions across assets.

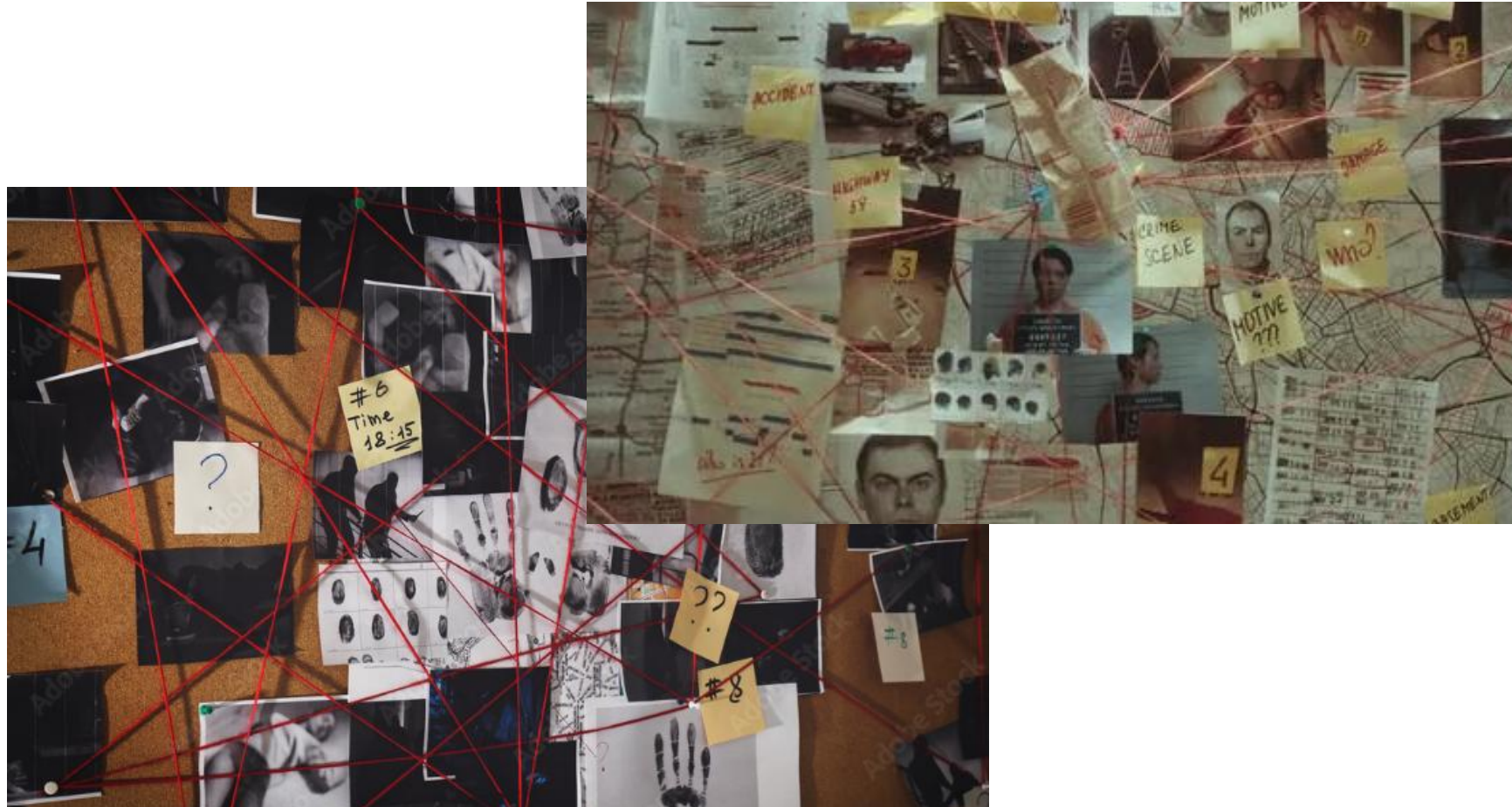
Closed Loop Building Components



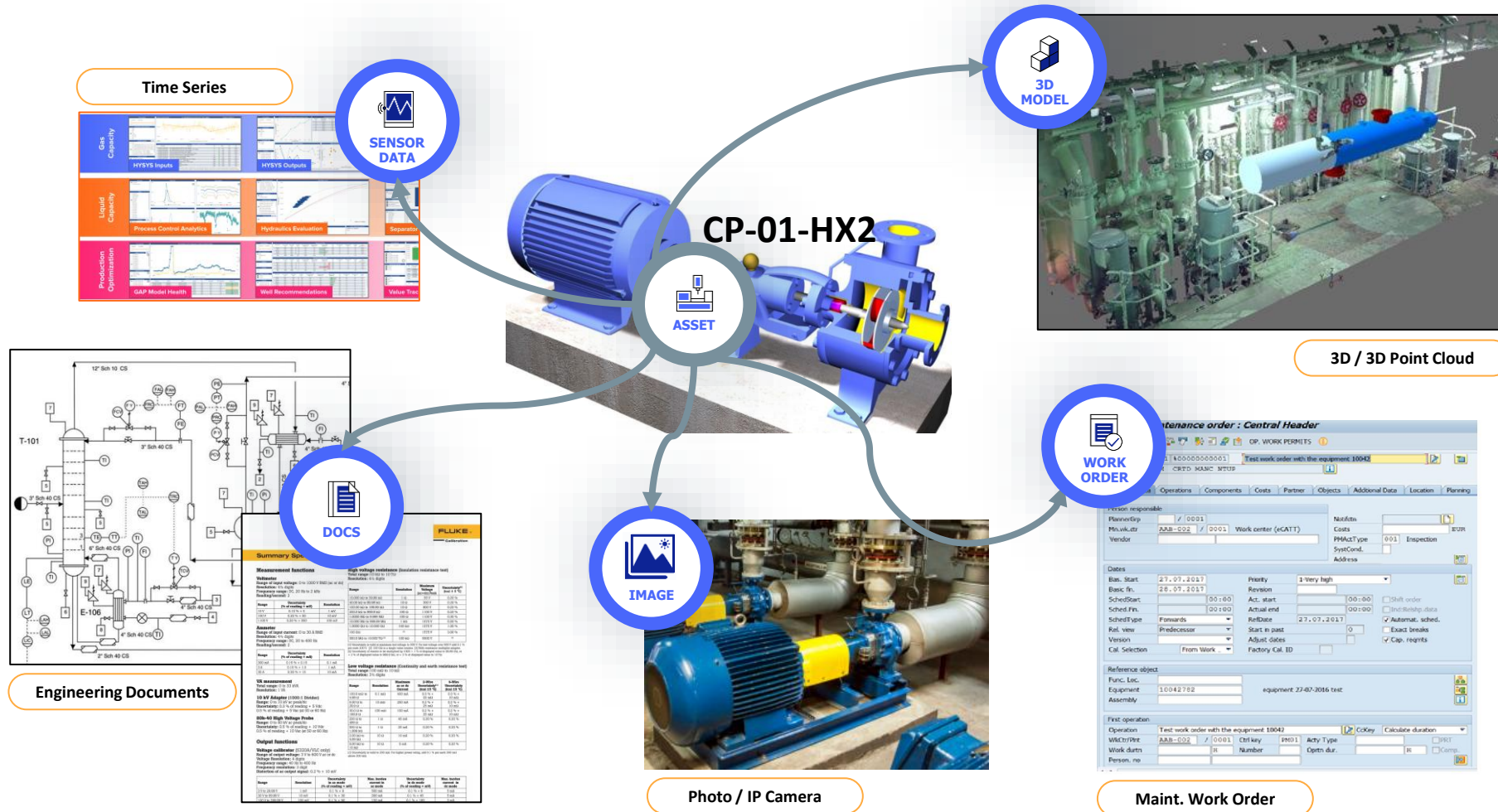
**KEY
TAKEAWAY**

Closed Loop is not a single solution,
it is a layered system combining **data, intelligence, and user experience.**

Establishing Relationship @ Knowledge Graph


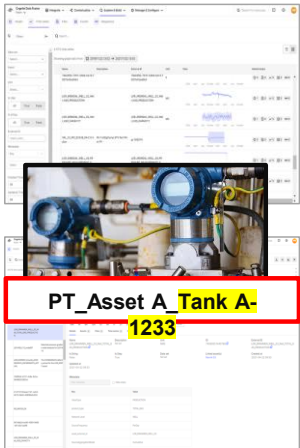
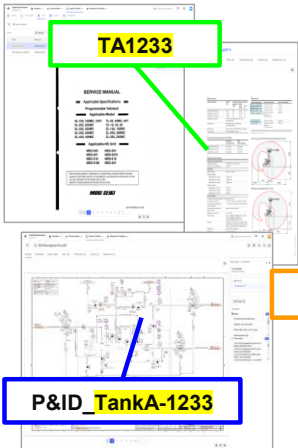
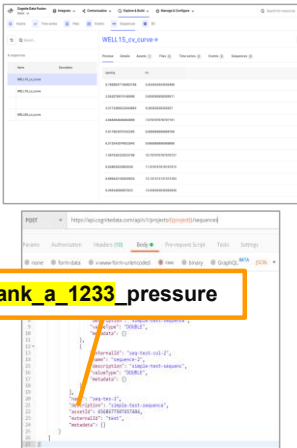

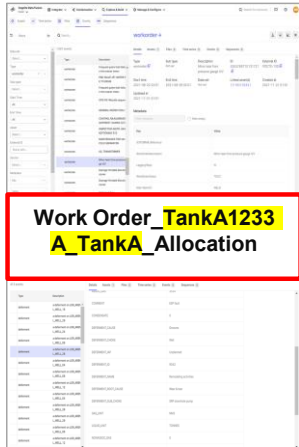


Establishing Relationship @ Knowledge Graph



Solving the Problems in Establishing Knowledge Graph

Industrial Data is Diverse, Complex, Siloed, Inconsistent...

Assets	Time series	Files	Multivariate Data	Visual data	Events
					

E.g. Equipment hierarchy from engineering tools or CMMS systems. Possibility to represent multiple hierarchies (e.g. asset, product).

E.g., real-time readings of temperature, pressure, speed, number of good parts produced, number of scraps and other KPIs.

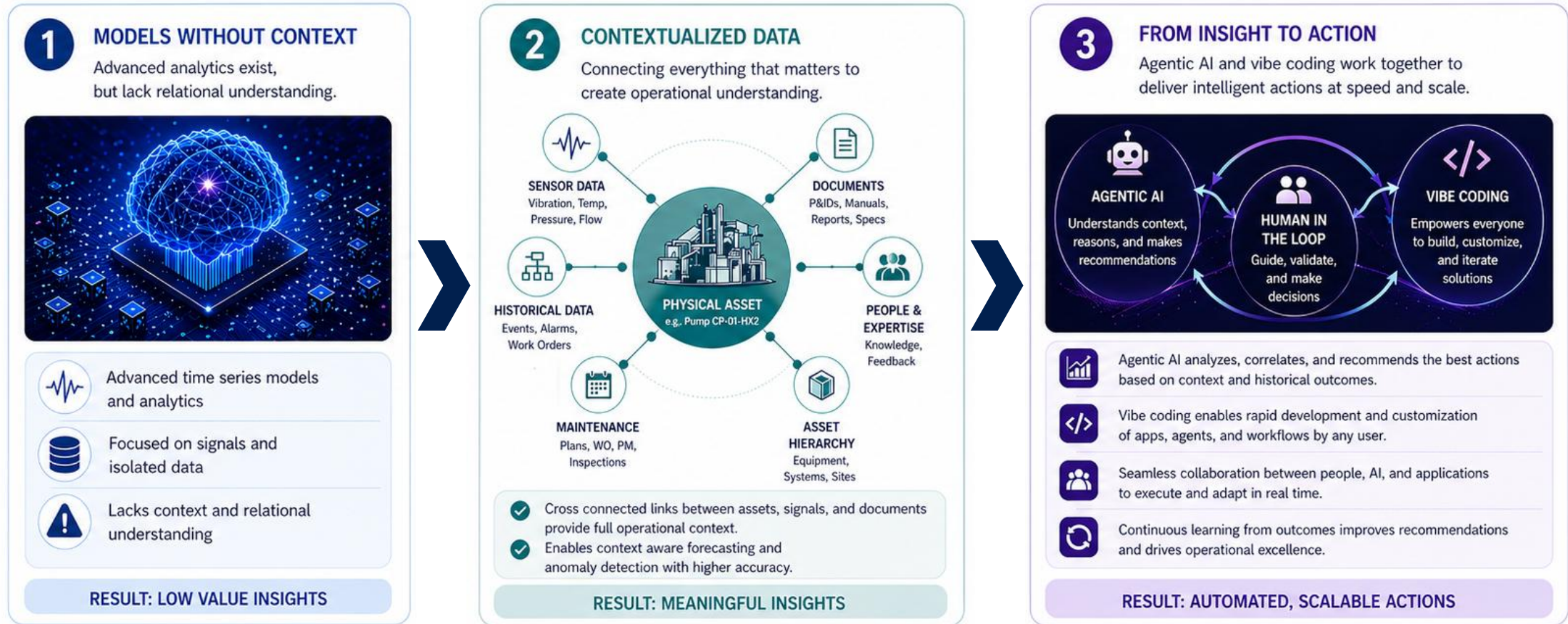
E.g., 2D CAD and scanned drawings, service manual, engineering diagrams, such as P&IDs and isometric drawings, and Bill of Materials.

E.g., operating curves, tabular data, multivariate data and LIMS data.

E.g., 3D CAD model of entire plants or components, images of equipment, laser scans/point clouds and 360 images.

E.g., real-time system failures and alarms, identified abnormalities, work orders, conducted inspections and production orders.

All Started with Context



KEY TAKEAWAY

The real breakthrough comes when context connects data, people, and systems.
That is when data and AI deliver real impacts.



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What Context Enables You?





What Context Enables You?

The screenshot displays the 'TAR Planner' software interface for the 'ClearLake Refinery — 2027 Turnaround' project. The interface is organized into several key sections:

- Project Overview:** Shows the project is 'AT RISK' and provides a timeline for 'Ethylene Cracker Unit 2 (ECU-2)' from Feb 1 to Mar 5.
- Key Performance Indicators (KPIs):**
 - PROGRESS:** 57% (2% behind), 89 of 156 packages completed.
 - DAYS REMAINING:** 25 days, 7 elapsed.
 - BUDGET SPENT:** \$28.3M (+8.2%), of a \$42.5M budget.
 - SCOPE GROWTH:** 12.4% (worsening), 12 items added.
 - WORKFORCE:** 222 people, 89% avg productivity.
 - CRITICAL PATH:** 4 items, 1.5d variance.
- WORK PACKAGE STATUS:** A bar chart showing 3 completed, 5 in progress, 3 not started, and 1 blocked packages. Overall progress is 57%.
- MILESTONES:** A list of tasks with completion status and critical path (CP) indicators:
 - Unit Isolation Complete (CP) - Done (Feb 1)
 - Blinds Installed (CP) - Done (Feb 2)
 - Gas-Free Certification (CP) - Done (Feb 3)
 - All Equipment Opened - Done (Feb 5)
 - Initial Inspections Complete (CP) - Done (Feb 7)
 - Emergent Scope Freeze (CP) - At Risk (Feb 10)
 - Mechanical Completion - Critical Path (CP) - At Risk (Feb 18)
- CRITICAL PATH:** A list of high-priority items:
 - Cracking Furnace F-201 Tube Replacement (65% complete, TechServ Industrial)
 - Transfer Line Exchanger TLE-201 Inspection & Re... (55% complete, HeatTech Solutions)
- DECISIONS NEEDED:** Three items requiring immediate attention:
 - EO Reactor Gasket Replacement Sequencing (IMMEDIATE):** Potential 2-day critical path impact if not sequenced correctly. Recommendation: Start gasket work immediately, parallel path with catalyst change. Adds \$380K but prevents 2-day delay.
 - Fractionator Tray Repair — Scope Addition (TODAY):** Non-critical path, 5-month payback on repair cost. Recommendation: Add to scope. Non-critical path, short payback, and avoids re-entry next year.
 - RotaMech Productivity Intervention (TODAY):** C-401 is on critical path. Every day of delay = potential TAR extension. Recommendation: Mobilize dedicated crane for C-401 area. Cost: \$15K/day vs \$5-50M/day TAR overrun risk.



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Thank you