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AI on Legacy Machines: From Sparse Signals to Real Outcomes

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Agenda

- Framing the challenge
- Practical paths to start with AI and Data fundamentals
- Demo
- Blueprint

Framing the Challenge in Manufacturing

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AI Adoption Motivations

Executive leadership drives AI adoption to boost production efficiency, sales, and profitability in manufacturing.

Legacy Equipment Challenges

Existing machines are under depreciation, lack telemetry, and have limited data access and compute capabilities.

Non-Invasive AI Retrofits

Non-invasive AI retrofits enable AI deployment alongside current equipment without hardware replacement or downtime.

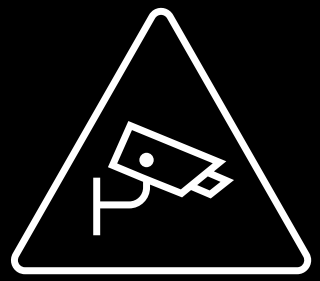
Operational Constraints

Challenges include data scarcity, hardware limits, and operational risk, requiring practical AI implementation strategies.

Practical paths to start with AI and Data fundamentals

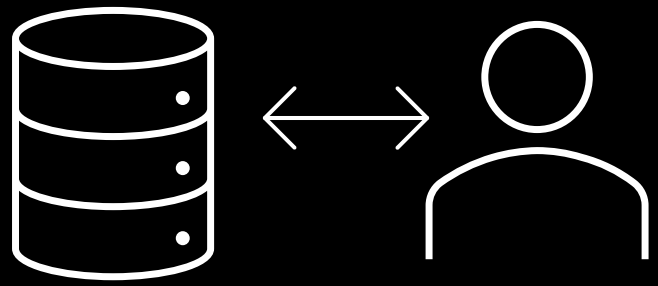
Practical paths to start with AI

Sensor-based



(e.g. gauge reading, defect detection)

Proxy data

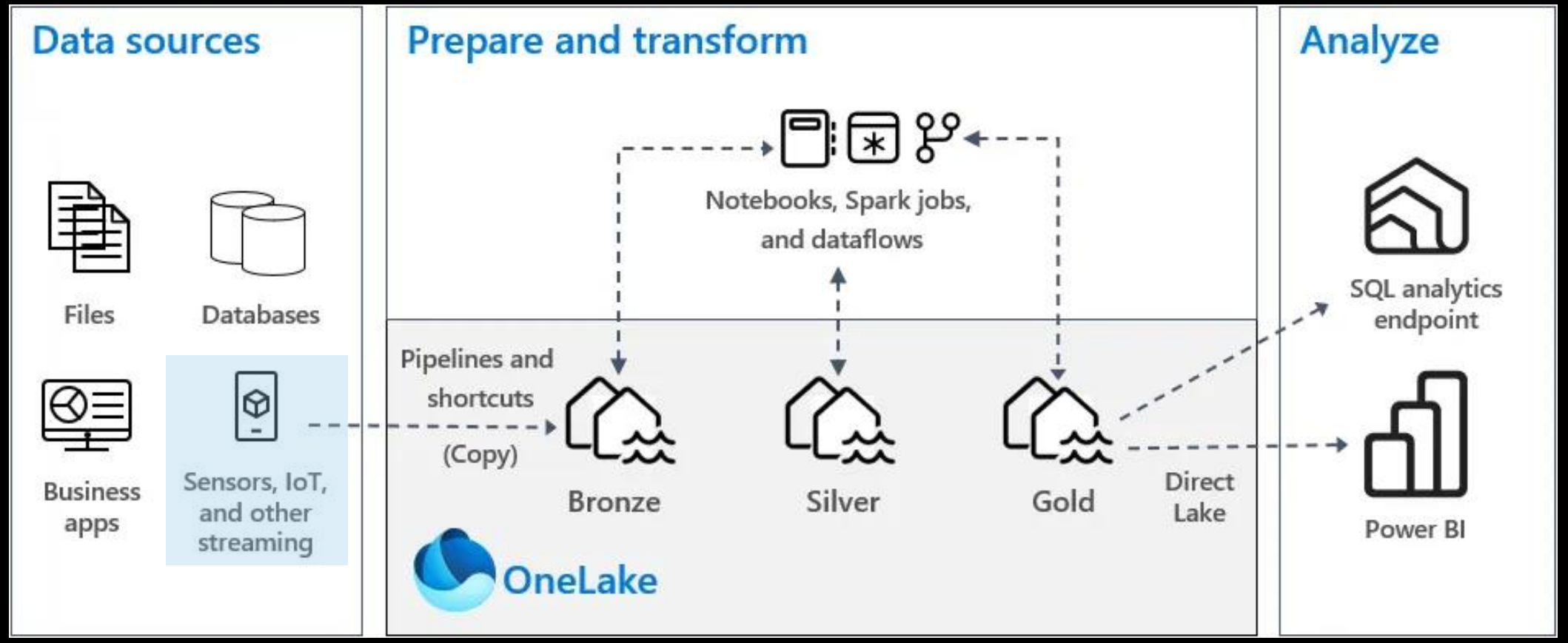


(e.g. downtime logs, operator input)

Edge gateway or hybrid cloud inference

(local pre/post-processing + cloud AI)

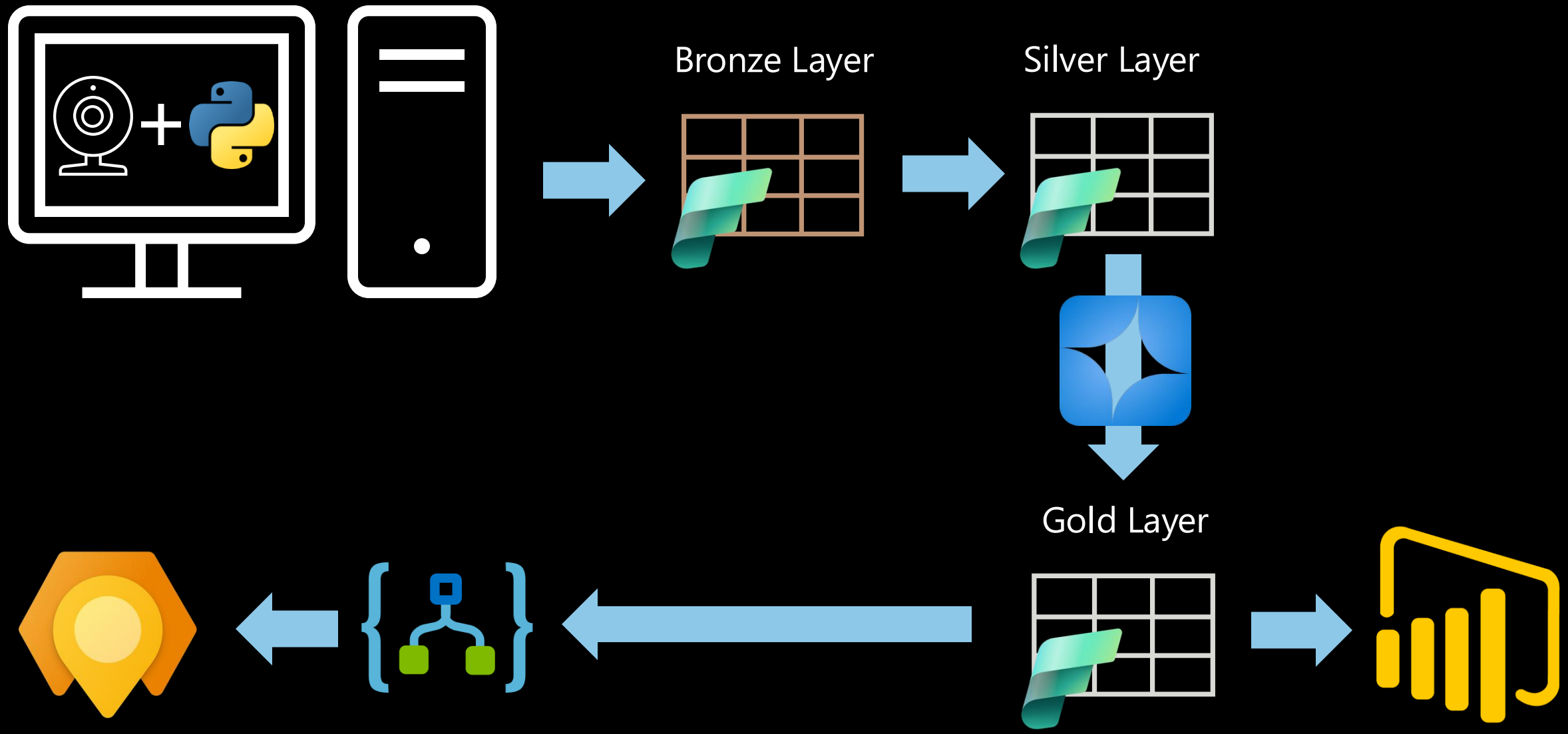
Demo Fundamental – Medallion Architecture



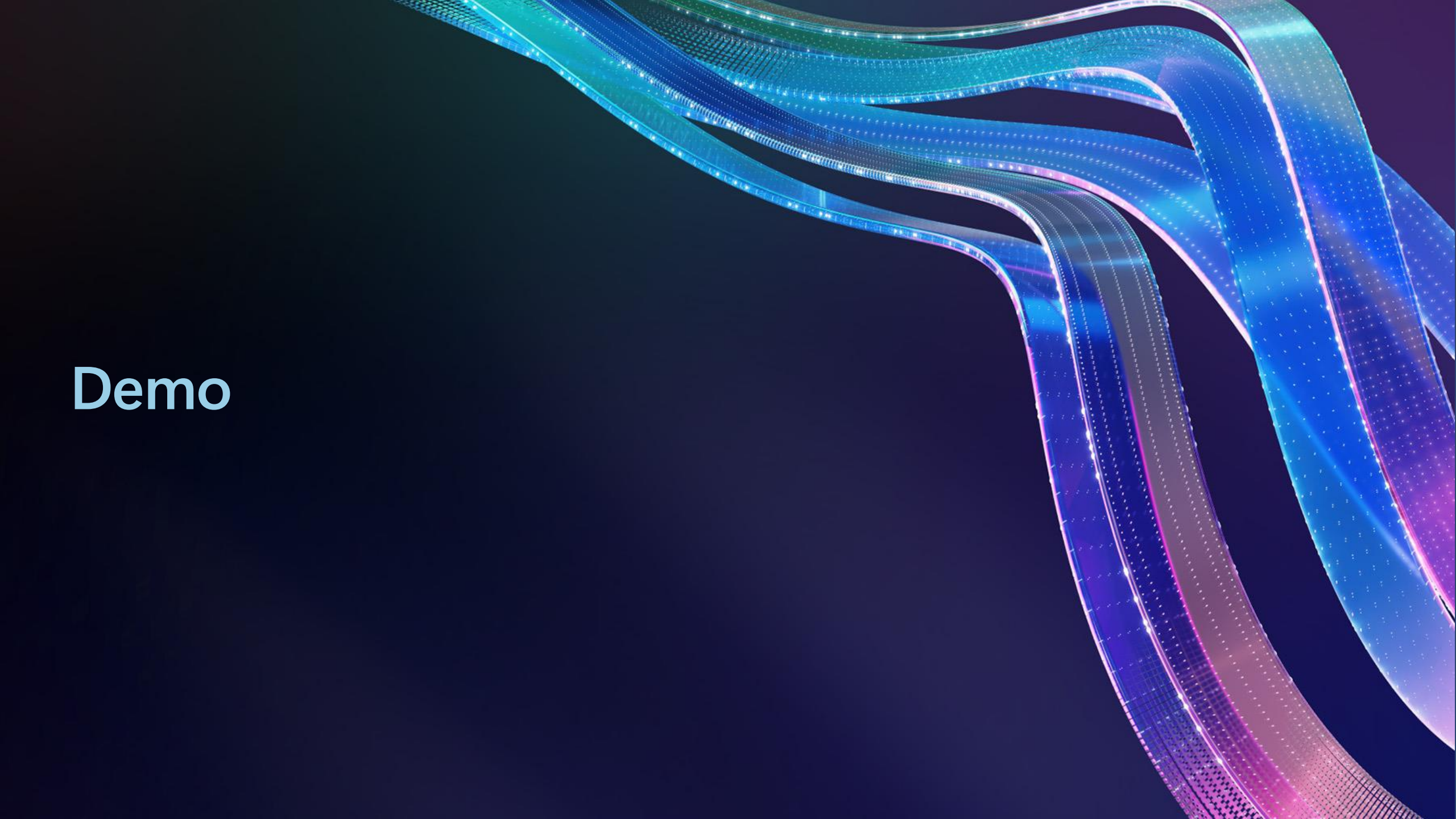
Picture from Bas Land – "That Fabric Guy" - https://thatfabricguy.com/medallion-architecture-microsoft-fabric-theory-guide/

Demo

Demo Flow



Demo

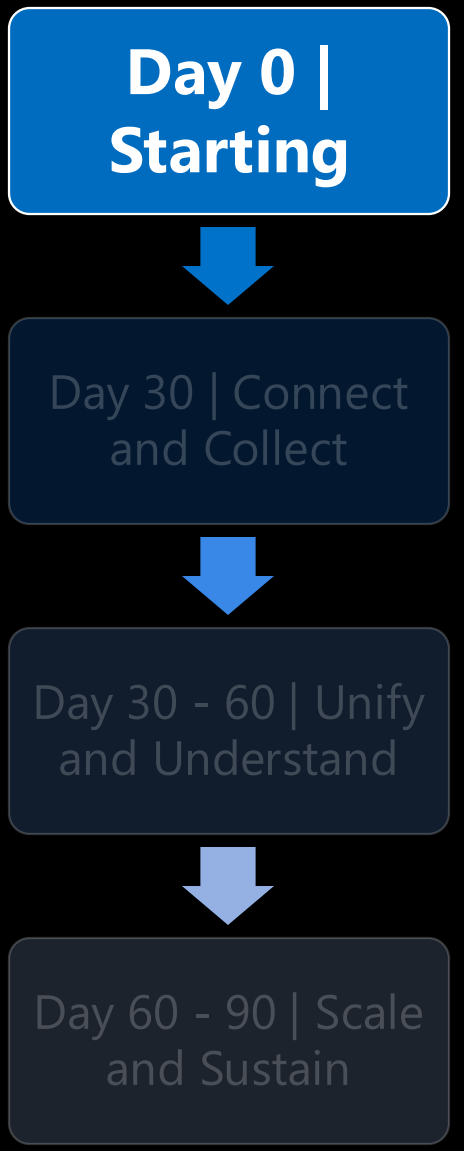


Blueprint

Day 0 - Starting Point

Production and Monitoring Highlights

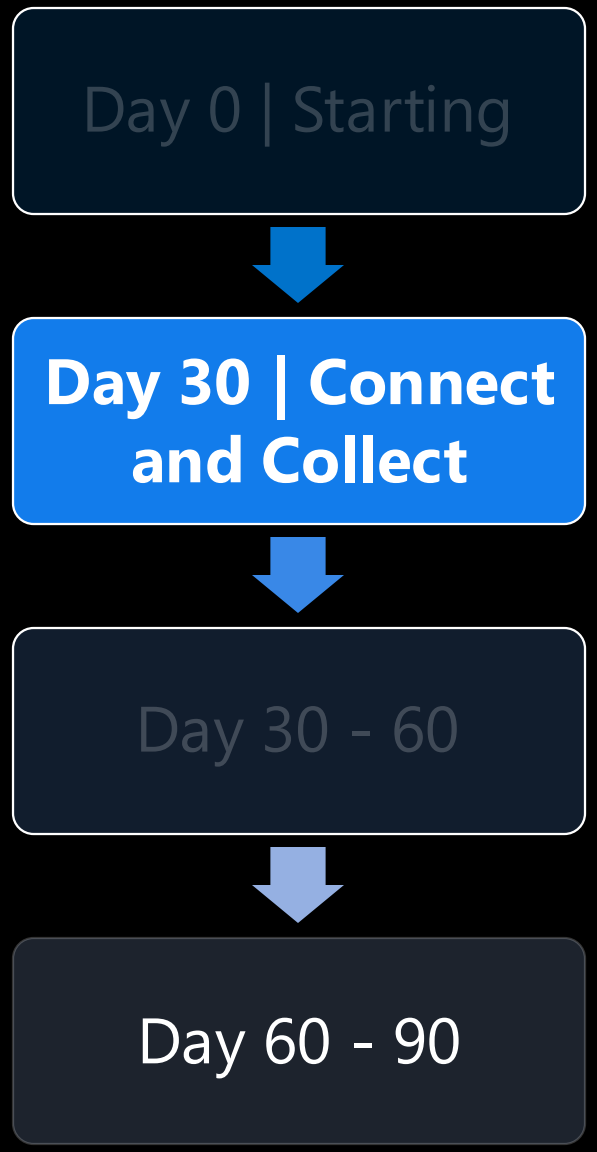
- Legacy production line lacks extensive telemetry
- Access available to Azure and Microsoft Fabric workspace
- Concentrate on one or two critical machines
- Resolve known issues and patterns causing downtime



First 30 Days - Connect & Collect

Machine Data Visibility Steps

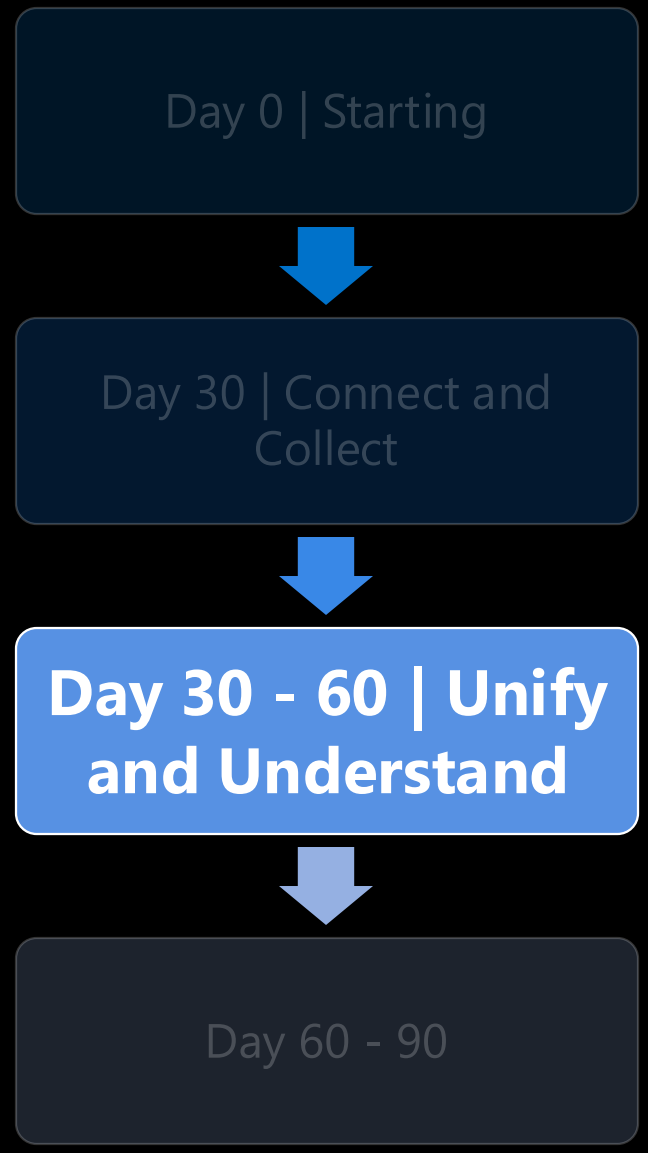
1. Make machine data visible
2. Install non-invasive sensors (vibration, current, temperature, camera)
3. Stream data through Eventstream to Lakehouse (Bronze table)
4. Perform basic transformations and create Power BI dashboard
5. Produce machine heartbeat dashboard
6. Establish governance (naming, retention, access roles)



Next 30 Days (Day 31-60) - Unify & Understand

Steps to Develop Signal Insights

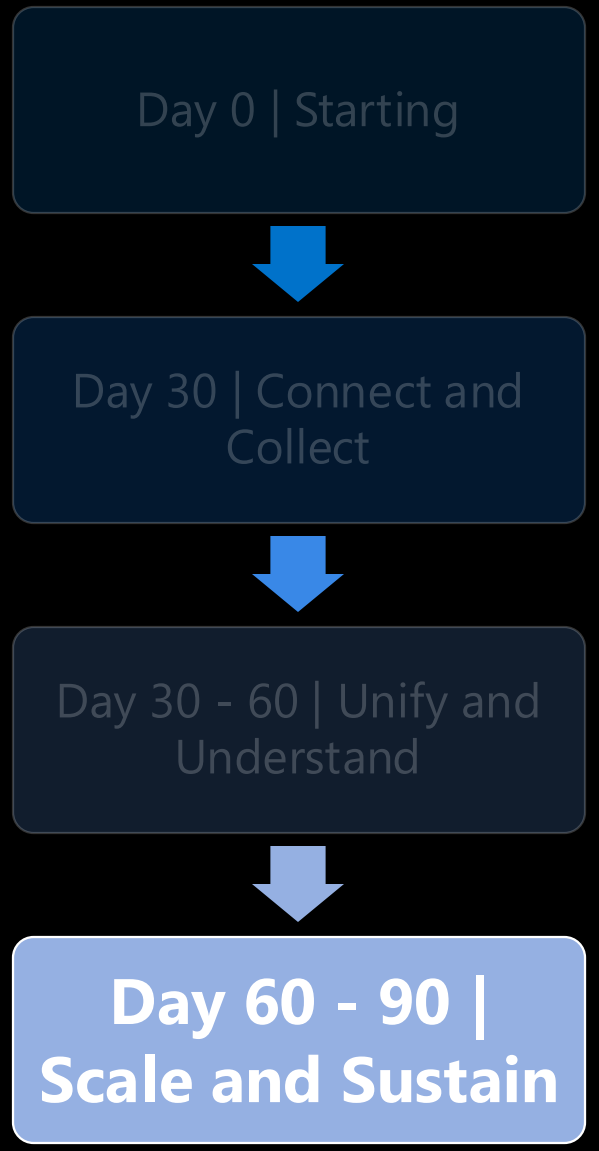
1. Turn signals into structured insights
2. Build Silver table with computed metrics
3. Use Azure OpenAI for anomaly explanations
4. Validate AI output with experts
5. Deliver enrichment pipeline and prompt logic
6. Send confirmed alerts to e.g. Dynamics 365 Field Service



Final 30 Days (Day 61-90) - Scale & Sustain

Steps to Operationalize Fabric Solution

1. Move beyond pilot phase
2. Automate and schedule enrichment jobs
3. Define SLA thresholds and risk scores
4. Monitor success metrics like downtime and MTTR
5. Train maintenance team and document workflow
6. Deliver productionized Fabric solution and training kit

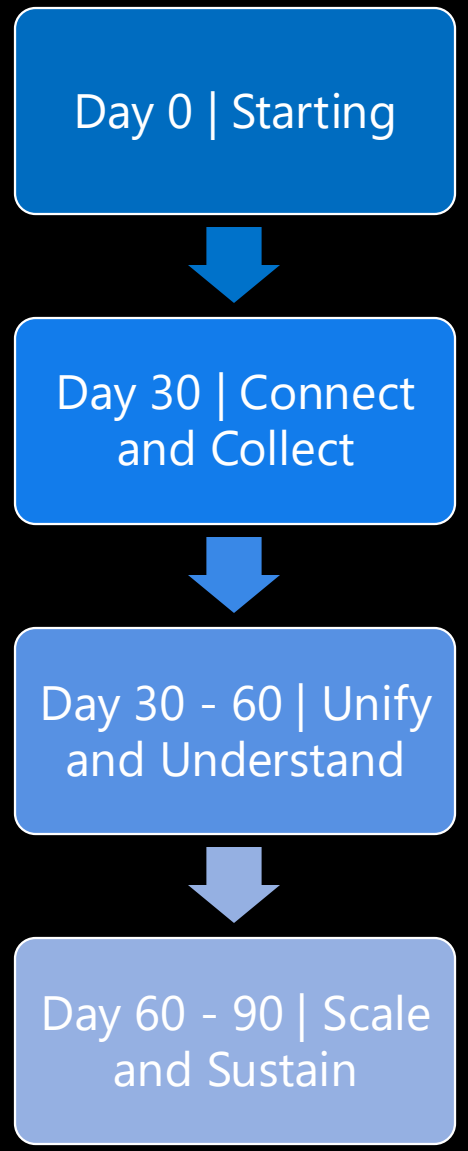


Outcome Roadmap Summary

- 0-30 days | Connect & Collect
  Sensor installation, Bronze data aggregation, Power BI dashboard creation

- 31-60 days | Unify & Understand
  Silver table development, AI-driven insights, D365 case automation implementation

- 61-90 days | Scale & Sustain
  Scheduled data pipelines, training sessions, ROI reporting



Key Takeaways

- Begin by establishing visibility prior to focusing on intelligence
- Leverage Azure OpenAI to transform limited data into practical insights
- Integrate Dynamics 365 to automate service processes and close the feedback loop

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