

## Case Study: AI-Powered Data Analysis & Machine-Learning Modeling on AWS

A mid-market manufacturing client\* engaged LJA New Media to unlock real-time, predictive insights from siloed production and inventory data. Leveraging AWS native services—AWS Glue, Amazon S3, Amazon Redshift, Amazon SageMaker, AWS Lambda, and Amazon QuickSight—we delivered an end-to-end data-to-decision platform that reduced unplanned downtime by 18%, cut excess inventory by 22%, and generated a 4× ROI within six months.

\*Client name anonymized for confidentiality.

### Client Overview

- **Sector:** Discrete manufacturing (industrial components)
- **Revenue:** US \$42 M
- **Employees:** ~260
- **Tech stack before project:** On-prem ERP (MS Dynamics GP), spreadsheets, limited BI.
- **Strategic mandate:** Increase plant throughput and cashflow while containing rising operating costs.

### The Problem

1. Fragmented data prevented holistic visibility across plants.
2. Reactive maintenance led to costly equipment failures—average 14 h/month downtime.
3. Inaccurate demand forecasts caused chronic over- and under-stock situations.

**Leadership needed a scalable, low-risk path to predictive analytics without overtaxing their lean IT team.**

## Approach & Solution Framework

Phase	Duration	Key Activities	Decision Gates
Discovery & Assessment	3 weeks	Data inventory, KPI definition, AWS landing-zone review	Go / refine scope
Pilot Build	6 weeks	Stand-up data lake & warehouse, build first ML model (downtime prediction)	Pilot value $\geq$ \$100 K?
Scale-up & Dashboards	6 weeks	Expand models (demand forecast), integrate QuickSight KPI suite	Adoption target > 75 %
Transition & Training	2 weeks	Upskill client analysts, hand-over DevOps runbooks	Sustained ops readiness

### Stage 1 - Discovery & Value Alignment (Weeks 0-3)

- Stakeholder workshops to crystalize business hypotheses, critical KPIs and success economics.
- Rapid data inventory across ERP, historian, and sensor networks; data quality heat-map drives cleansing prioritization.
- AWS landing-zone review to confirm security baselines (IAM, KMS, VPC, tagging).

**Outcome:** Signed backlog, target-state architecture, and investment case pitched in CFO-ready language.

### Stage 2 - Data Lakehouse & Pilot Model (Weeks 4-9)

- Provision Amazon S3-based data lake and Amazon Redshift curated zone via AWS CloudFormation.
- Build automated AWS Glue ingestion pipelines with schema versioning.
- Develop first predictive-maintenance model in Amazon SageMaker using XGBoost; establish Feature Store.
- Expose real-time inferences through AWS Lambda endpoint integrated into the client's CMMS.

**Outcome:** Pilot delivers  $\geq$  US \$100 K quantified benefit, de-risking full roll-out.

## Approach & Solution Framework (cont.)

### Stage 3 - Scale-out Analytics & BI (Weeks 10-15)

- Extend ML portfolio to demand-forecasting (Prophet + XGBoost ensemble) and inventory optimisation.
- Configure Amazon QuickSight dashboards and row-level security for plant, finance, and supply-chain personas.
- Set up SageMaker Pipelines, model registry, and automated CI/CD (CodePipeline, CodeBuild) for MLOps.

**Outcome:**  $\geq 75\%$  target users actively consume dashboards; leadership sign-off for enterprise adoption.

### Stage 4 - Enablement & Operational Excellence (Weeks 16-17)

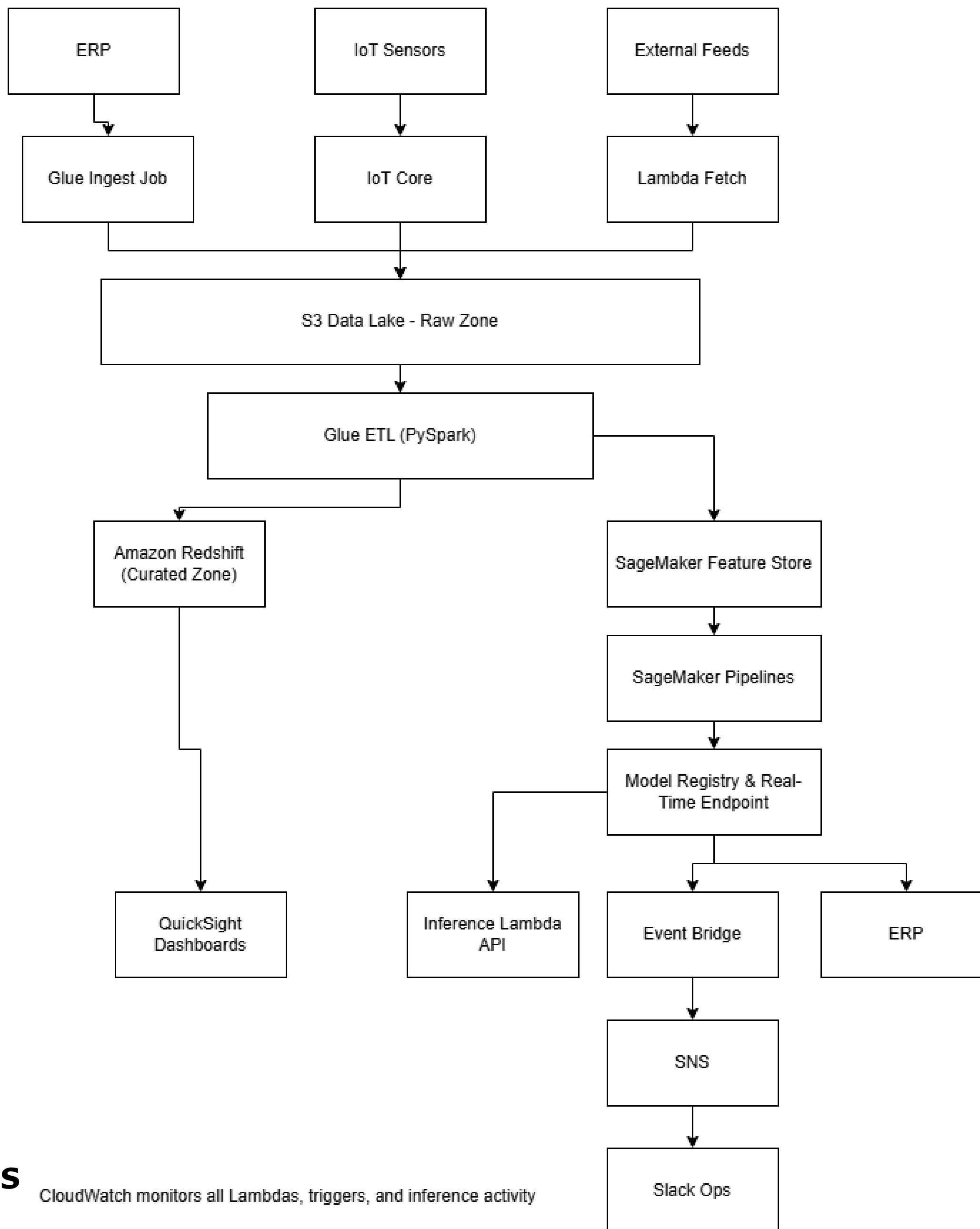
- Conduct five hands-on enablement sessions; deliver playbooks for incident response, cost monitoring, and model drift remediation.
- Transfer IaC stacks, tagging strategy, and OpsCenter runbooks to client DevOps team.
- Establish FinOps guardrails (AWS Budgets + Cost Explorer) ensuring OpEx neutrality post-project.

**Outcome:** Client self-sufficient within two weeks; LJA moves to light-touch advisory retainer.

### Governance & Rigor Throughout

- Weekly steering meetings with RACI-mapped action log.
- Dual-track sprint planning (data & ML) ensures parallel value delivery.
- Stage-gate reviews anchored on measurable business value rather than technical completion.

**Total elapsed time:** 17 weeks from kick-off to organization-wide go-live.



## Highlights

CloudWatch monitors all Lambdas, triggers, and inference activity

- **Serverless ingestion & ETL:** AWS Glue crawlers automate schema discovery; jobs run on demand, saving 40% vs. persistent ETL servers.
- **Unified analytics store:** S3 + Redshift Spectrum enables both scalable storage and SQL performance.
- **Reusable feature store:** Centralized features accelerate new model development.
- **MLOps on SageMaker:** Pipelines handle training, evaluation, and blue-green deployment; model accuracy is monitored with built-in bias detection.
- **Event-driven insights:** Lambda exposes REST endpoints consumed by the ERP for just-in-time maintenance tickets.
- **Self-service BI:** Executives explore near real-time KPIs in QuickSight without additional licenses.

## Quantifiable Results (After 6 months)

KPI	Baseline	After	Δ	Value Realized
Unplanned downtime	14 h/mo	11.5 h/mo	-18 %	+US \$160 K annual throughput
Forecast accuracy (SKU-level MAPE)	31%	24%	+7 pp	-US \$1.2 M inventory holding costs
Working-capital tied in raw materials	60 days	47 days	-22 %	+US \$900 K cash unlocked
Analytics adoption (active users / month)	0	58	-	82 % of target population
Project ROI	-	-	4x	Payback in < 5 months

### Strategic Learnings

- **Pilot-first mindset:** Tight 6-week pilot de-risked investment and delivered early wins.
- **AWS native focus:** Leveraged fully managed services—no additional DevOps headcount.
- **Change management & training:** 5 interactive workshops equipped ops managers to interpret ML outputs and embed them into daily stand-ups.
- **Modular architecture:** Enables rapid extension to quality-inspection vision models next quarter.

### Additional Pilots & AWS Scaling

Following the pilot's success, the client is evaluating additional projects. Key enhancements for the next phase include:

- Deploy anomaly-detection on energy-consumption data (expected 8% cost savings).
- Explore generative-AI-assisted work-order summaries using Amazon Bedrock.

**Ready to transform your business with AI-driven solutions? Contact LJA New Media today to schedule a discovery call and explore how our AI Solutions can propel your business to new heights.**