
AWS
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IOT304

Improving product quality using AWS IoT SiteWise

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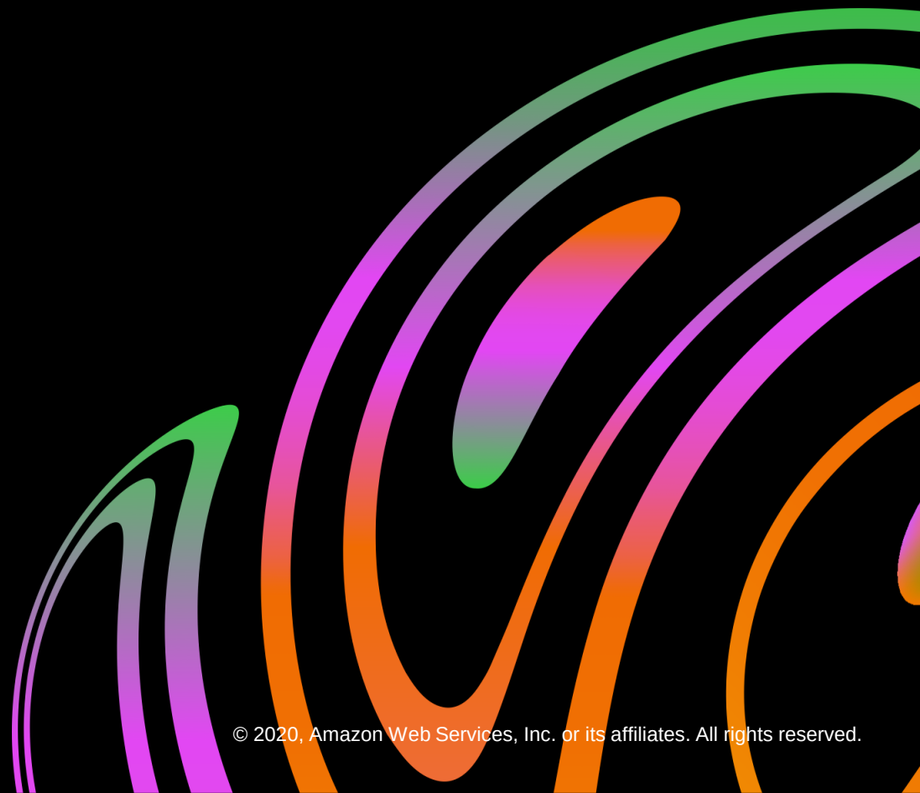
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Agenda

Manufacturing customer challenges

A customer story on improving paint quality

Deep dive on TensorIoT SmartInsights



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Manufacturing customer challenges

Most days we're fairly productive… but some days operations are chaotic

We have older machines that we need to keep and also make smart

Our machines go down sometimes, but we lack data for root cause

We do track a lot of stuff on paper and some digitally but often forget to write things down

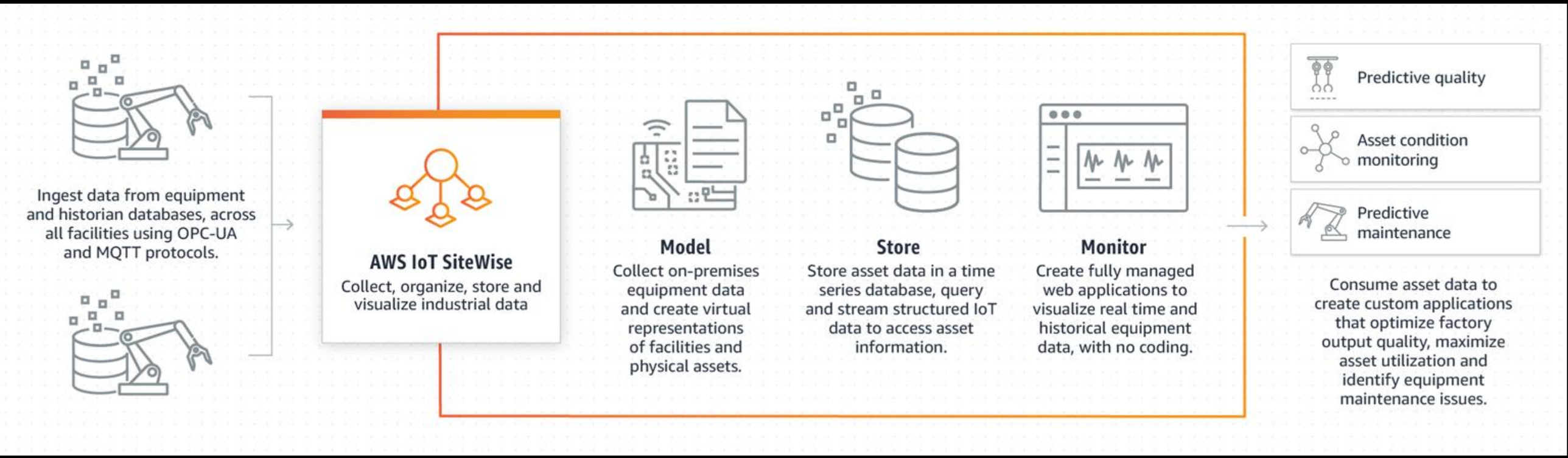
We may have more capacity… but no real-time view of inventory and supply chain to decide

We wish for a real-time view of what's happening on the shop floor for all sites

Solution implementation challenges

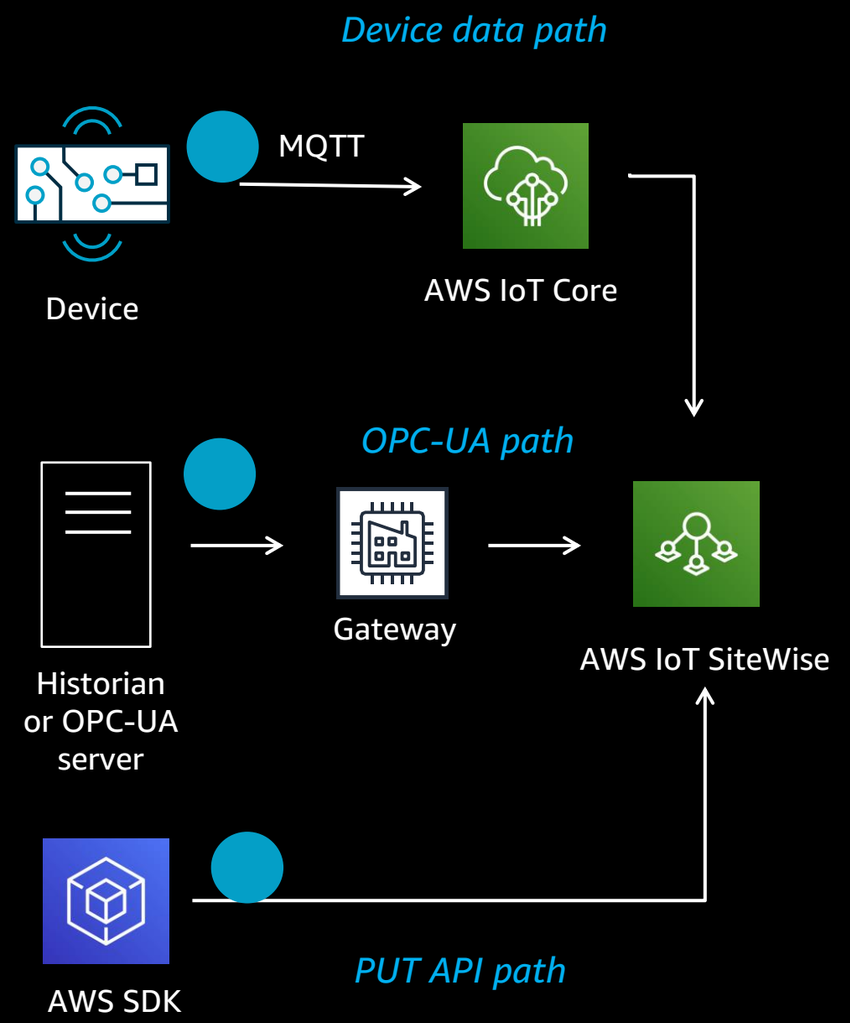
- 30+ PLC / SCADA / RTU manufacturers
- 300+ industrial protocols
- Information technology (IT) and operational technology (OT) integration
- Lack of single source of truth for data (silos)
- Limited scalability of on-premises and cost
- Undifferentiated heavy lifting for device connectivity, certification of edge hardware

AWS IoT SiteWise



Ingest data

- Collect data from equipment / machines and historians across all sites
- Send data to AWS IoT SiteWise from AWS IoT Core and through BatchPutAssetPropertyValue API
- Supports MQTT and OPC-UA protocols
- Remotely manage edge gateways



Model assets

Static descriptions

Raw data, time / quality / value

Translate measurements

Compute metrics

```
Model name: Machine
Property {
    Attribute { Name: string }
    Measurement{ Widget Output: INTEGER}
    Measurement { Temperature_in_C: FLOAT}
    Transform {
      Temperature_in_F: FLOAT;
      value = 9/5 * tempC + 32
      }
    Metric {
      Efficiency: FLOAT;
      value = Widget Output/Capacity
      window = 1 hour
      }
}
```

Add model hierarchy

```
Model name: Site
Name: string
```

```
Model name: Metal-Press-Line
Name: string
```

```
Model name: Metal-Bench-Press
Name: string
Property {
  Measurement: Widget Output
  Metric:
     Efficiency = Widget Output/Capacity
}
```

Create instances from model

Parent asset (Site)

```
Model name: Site
Name: Portland-Press-Shop
```

Parent asset (Line)

```
Model name: Metal-Press-Line
Name: Line1
```

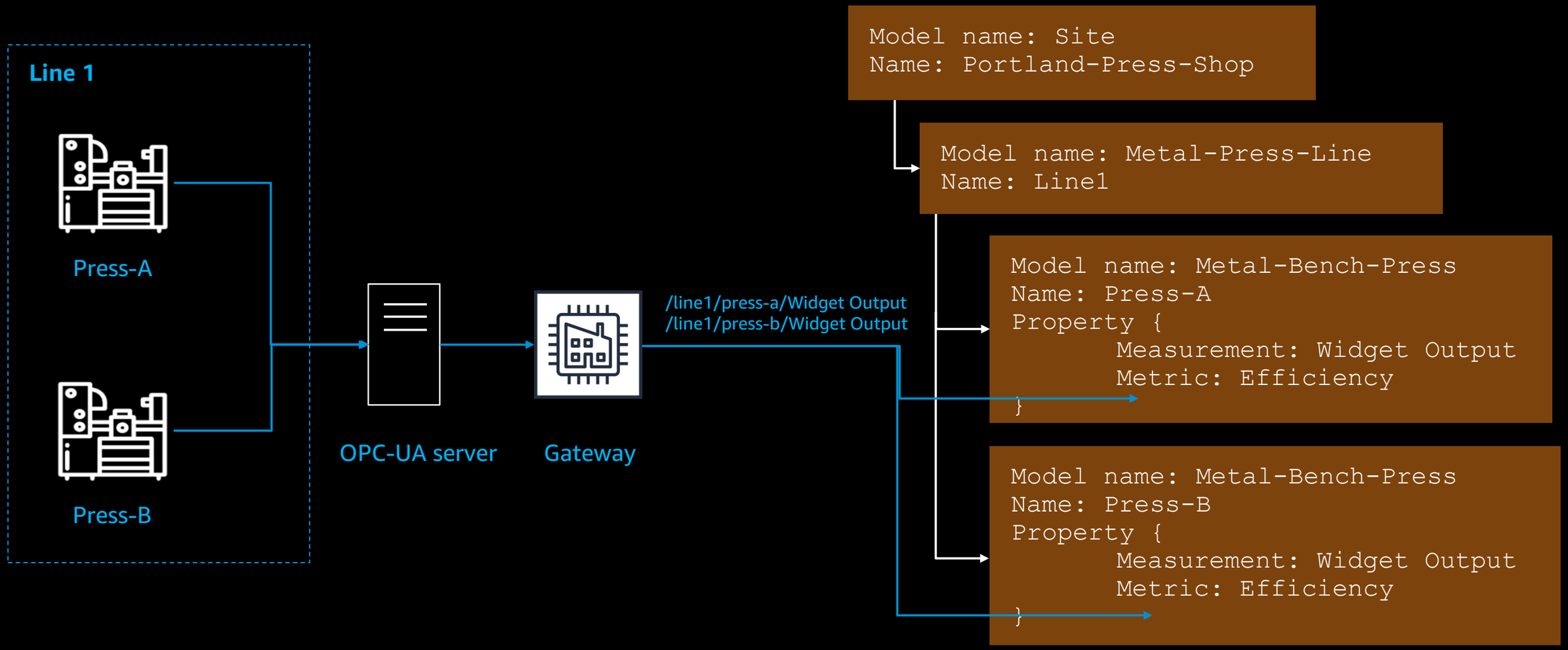
Instance of an asset (Press-A)

```
Model name: Metal-Bench-Press
Name: Press-A
Property {
      Measurement: Widget Output
      Metric: Efficiency
}
```

Instance of an asset (Press-B)

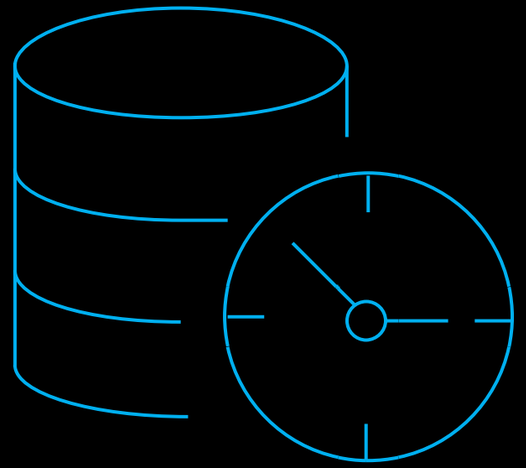
```
Model name: Metal-Bench-Press
Name: Press-B
Property {
      Measurement: Widget Output
      Metric: Efficiency
}
```

Link measurements to assets



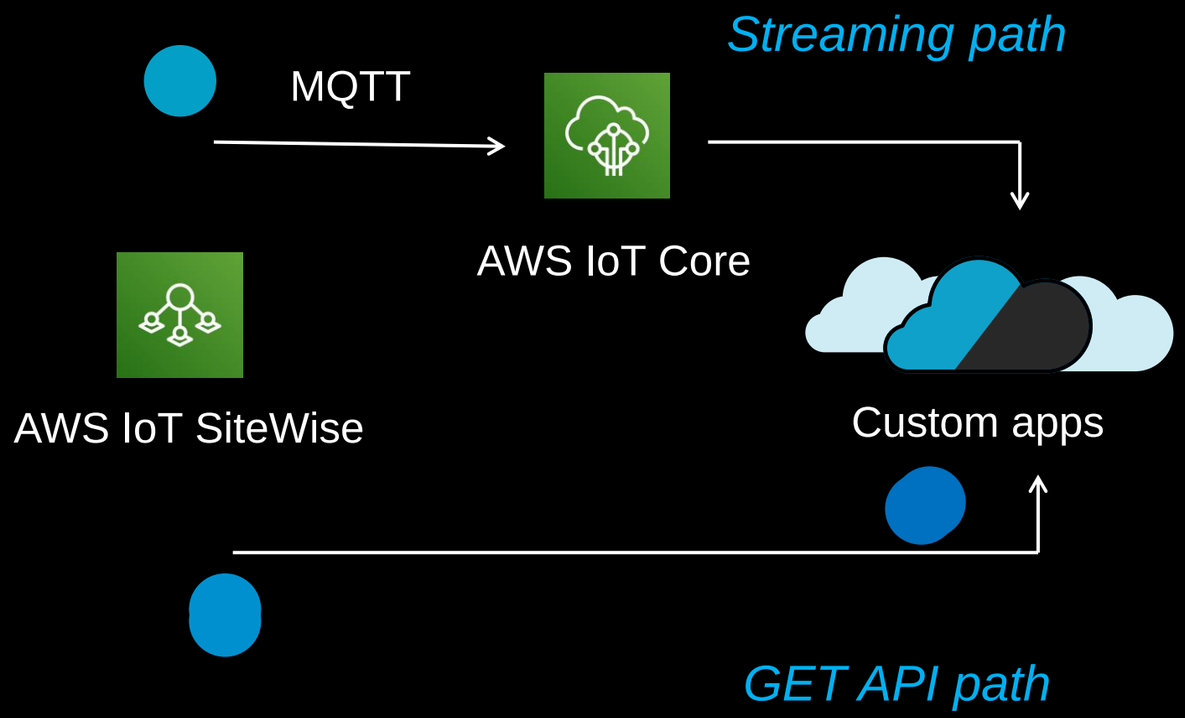
Store time-series data

- Scalable, performant, and managed time-series data store
- No capacity planning or provisioning needed
- Low-latency access to equipment data and computed metrics



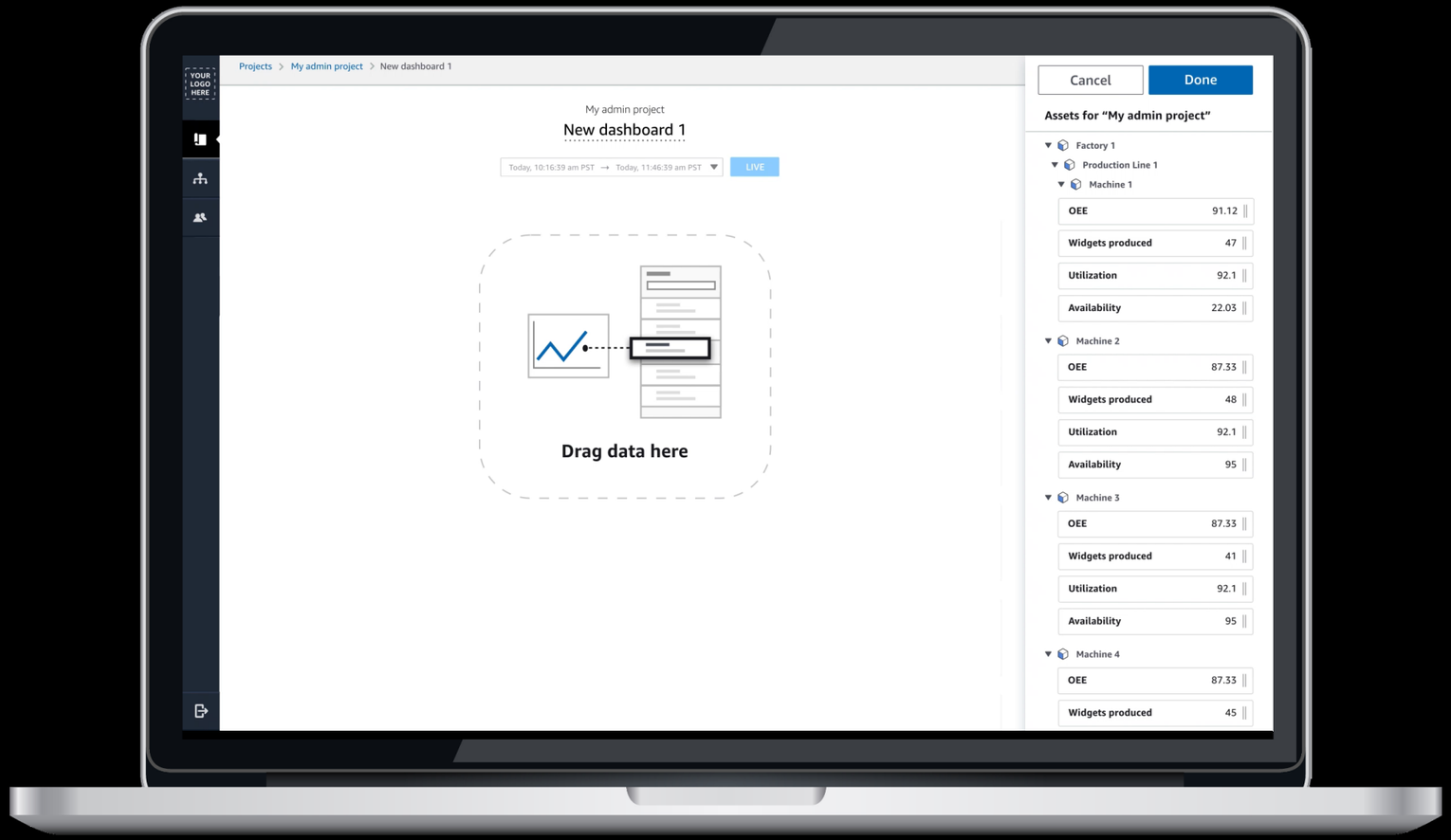
Retrieve data

- Publish-subscribe interface streams the asset property updates to an MQTT topic
- GET APIs to query historical values of measurements and metrics
  - GetAssetPropertyValue
  - GetAssetPropertyValueHistory
  - GetAssetPropertyAggregates



SiteWise Monitor

Create a fully managed web application for visualizing and interacting with operational data from devices and equipment connected to AWS IoT



A customer story: Improving paint quality



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Genie
A TEREX BRAND



Problem

Genie – A Terex Brand is a global manufacturer of lifting and material handling products and services delivering lifecycle solutions that maximize customer return on investment. Genie needed to improve the quality and reliability perception of their Genie brand of lifting equipment by eliminating the problem of chipped, missing, and peeling paint, which is leading to increasing warranty claims from customers.

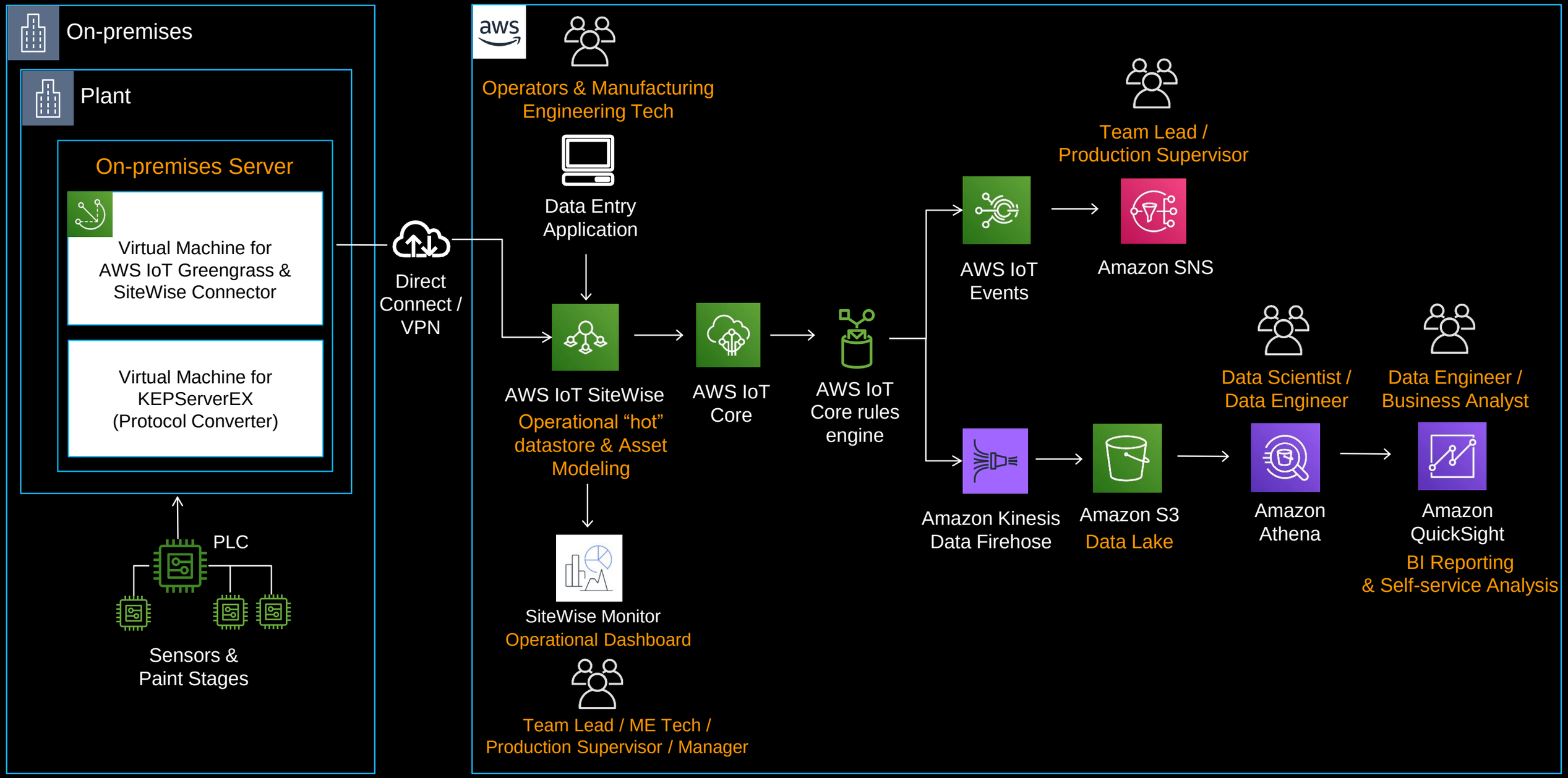
Solution

Genie deployed a secure, scalable, and repeatable paint process monitoring solution, spanning the factory floor to the cloud. Using AWS IoT SiteWise, Genie is able to ingest, organize, and analyze data from the paint process to identify inconsistent and improper pretreatment in near real time. This enables the application of necessary corrective actions to improve the paint quality of the manufactured Genie lifts.

Impact

Genie started their digital transformation journey by connecting 2 plants to AWS with a progressive plan to connect all of their 7 plants globally. With AWS IoT, Genie is looking to reduce warranty claims by improving paint quality and durability of their lift products.

Solution architecture



SmartInsights from TensorIoT



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SmartInsights

PRODUCT

Hardware to deploy on-site as a connector between OPC-UA and the AWS Cloud, enabling accelerated insights and business value by quickly liberating data from floor operations into the cloud

FEATURES

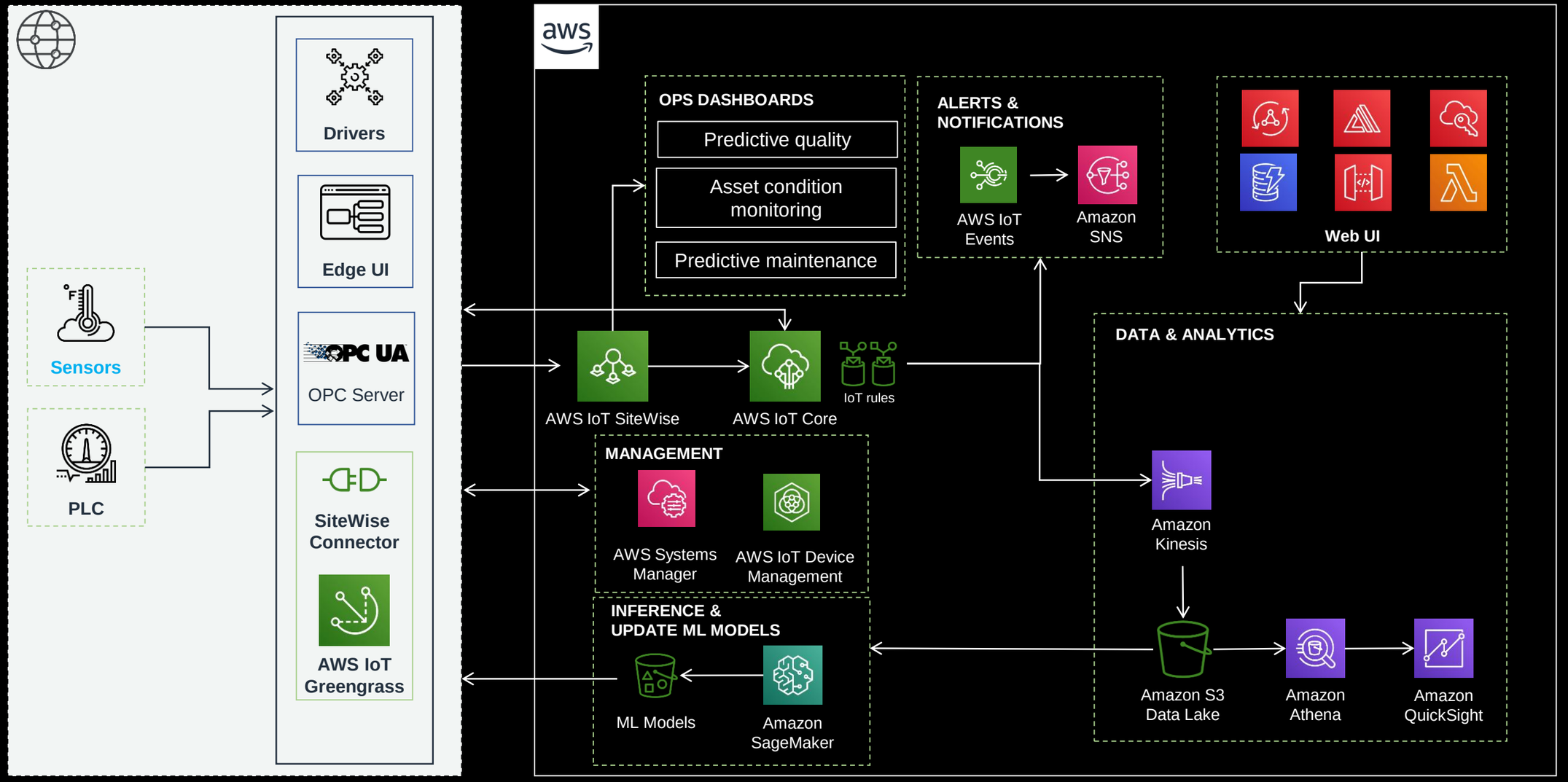
- Solution comes fully integrated with Hardware (Gateway and built-in OPC-UA server in one box), Software & UI
- Deployment comes packaged with cloud-based viewable dashboards for both operational data and business intelligence

OUTCOMES

- SmartInsights can get floor data hooked up and viewable in the cloud in days or weeks, where traditional methods would take months
- Derive measurable business outcomes, including improvements in Asset Utilization, Operational Efficiency, and Product Quality

TensorIoT

SmartInsights architecture



TensorIoT

SmartInsights demo



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SmartInsights implementation



CRAWL... 4 WEEKS

GETTING STARTED

WALK... 8 WEEKS

SINGLE SITE ADOPTION

RUN... 12 WEEKS + BEYOND

MULTI-SITE DEPLOYMENT

TensorIoT

Typical benefits realized



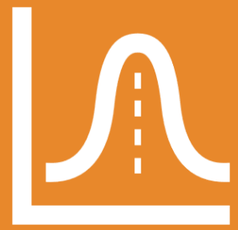
Product Quality

- Improve product quality by identifying improvement opportunities and efficiencies across the entire line



Operational Efficiency

- Identify the percentage of manufacturing time that is truly productive and improve manufacturing process



Process Optimization

- Eliminate waste, improve efficiency, and optimize operations. Use real-time data to improve productivity on the fly.



Anomaly Detection

- Integrate machine learning to analyze current conditions and identify deviations from normal operating behavior and facilitate corrective action.



TensorIoT

Wrap up



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Recap

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What’s new with AWS IoT SiteWise

Theme	Feature
Security	Support for customer-managed encryption key
	Support for AWS PrivateLink for data plane APIs
Data ingestion	Late data ingestion for up to 7 days
	Modbus TCP and EtherNet/IP protocol support (in addition to OPC-UA & MQTT)
Edge processing and filtering	Compression / filtering at edge with dead-banding & configurable scan rate)
	Support for AWS Lambda for custom aggregation and filtering at the edge
	AWS IoT SiteWise Edge (preview)
Visualization and insights	Managed industrial alarms (preview)
	AWS IoT SiteWise plug-in for Grafana
	New chart types in AWS IoT SiteWise Monitor (tabular, status line, scatter plots)
	Enhancements to metrics and transform computation (support for conditional logic, string manipulation functions, Boolean variables processing)
Usability	AWS CloudFormation support
Region expansion	Additional AWS Region availability in Asia Pacific (Singapore) and Asia Pacific (Sydney)

References

LEARN MORE

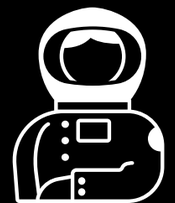
How to get started with AWS IoT SiteWise
https://aws.amazon.com/blogs/iot/collecting-organizing-monitoring-and-analyzing-industrial-data-at-scale-using-aws-iot-sitewise-part-1/

How Genie (a Terex brand) improved paint quality using AWS IoT SiteWise
https://aws.amazon.com/blogs/iot/how-genie-a-terex-brand-improved-paint-quality-using-aws-iot-sitewise/

AWS for Industrial
https://aws.amazon.com/industrial/

Industrial IoT solutions on AWS
https://aws.amazon.com/iot/solutions/industrial-iot/

TensorIoT SmartInsights solution
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