



Connecting Industrial Machines

with AWS IoT

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GTMS – IoT DACH / South EMEA

Agenda

- Who is using AWS IoT?
- How can I securely connect my devices to the cloud?
- What about security?
- AWS IoT SiteWise, a Industrial IoT configurable solution
- Cost model
- How to start?



Who is using AWS IoT?



AWS IoT customers solve problems in all sectors



CHALLENGE

Volkswagen Group, one of the world's leading automobile manufacturers is transforming its business to become the global leading provider of sustainable mobility and to improve production efficiency by 30%. To achieve that, VW Group needs a flexible, comprehensive and standardized industrial IoT platform that can ingest and combine data from all of its machines, plants and legacy applications.

SOLUTION

Volkswagen and AWS are developing the Volkswagen Industrial Cloud, which includes foundational platform services, spanning the edge to the cloud that can be swiftly adopted by VW business communities to enable various use cases. With the Digital Shop Floor Management solution, manufacturing shop floor data is ingested through AWS IoT SiteWise, stored in a data lake, and used by a custom web application to monitor near real time status of machines and calculate overall equipment effectiveness (OEE) for the cylinder production line.

IMPACT

For their component production processes, Volkswagen can reduce administrative efforts through automated data retrieval and reporting, achieve sustainable improvement of machine availability through transparent activity tracking and knowledge sharing across plants, and increase productivity by having full visibility into production losses and their influence factors.



engapplic Techno Brazing

CHALLENGE

A company dedicated to brazing welding with a 4-stage furnace needed to optimize electrical and gas consumption, as well as maximize productivity by reducing the cost per piece, and increase production quality by monitoring temperature. Guaranteeing its customers the process done by adding traceability. The increase in productivity went through attacking 2 key factors. First, reduce sudden changes in temperature, second, reduce downtime due to maintenance.



SOLUTION

Engapplic has added a Gateway system in charge of communicate the furnace with the AWS Cloud. The parameters that have been monitored are the temperature (°C) of the 4 zones, the speed of the belt, the power consumption and the general state of the machine.

Engapplic has integrated a gateway using AWS Greengrass with a Modbus bridge to MQTT using ROS2, in order to connect to AWS IoT Core and collect data to AWS SiteWise. The architecture is ready to work with AWS SageMaker and AWS QuickSight for more complex business intelligence.

IMPACT

With the data obtained using AWS IoT Core, it has been generated a dashboard with AWS SiteWise able to display the main parameters needed to optimize the production.

The main benefits have been:

- 70% decrease in unpredicted maintenance stops.
- 6% saving in energy consumption.
- 8% productivity increase due to optimized sequencing.
- 30% cost reduction on preventive maintenance.
- Quality increase with tracking system due to automatic generated reports.





Problem

CEPSA is a global energy company which operates in the five continents with businesses in Exploration and Production, Refining, Chemicals, Marketing, Gas and Electricity, and Trading. Current Industrial systems have proven to be limited for ML-based analytic processes that require integration of plant data with external sources like lab data and weather information.

Solution

CEPSA is standardizing IoT protocols to enable the creation of a low-cost data lake for operational data integrated to AI / ML and analytics. This has been achieved by deploying managed services like AWS IoT as MQTT messaging central broker, AWS IoT Greengrass in the edge, Amazon Kinesis, Amazon Simple Storage Service (Amazon S3), Amazon Athena, and more.

Impact

The data lake is capable of ingesting and processing an average of 2,000 signals per second, with capacity to store several years of data with projected growth at the petabyte-level. By enabling the data for machine learning, CEPSA was capable to increase production by 2.5% (or 5,500 tons/year) on phenol line 3 at the Palos Chemical Plant in Huelva, CA.

PENTASOFT**CHALLENGE**

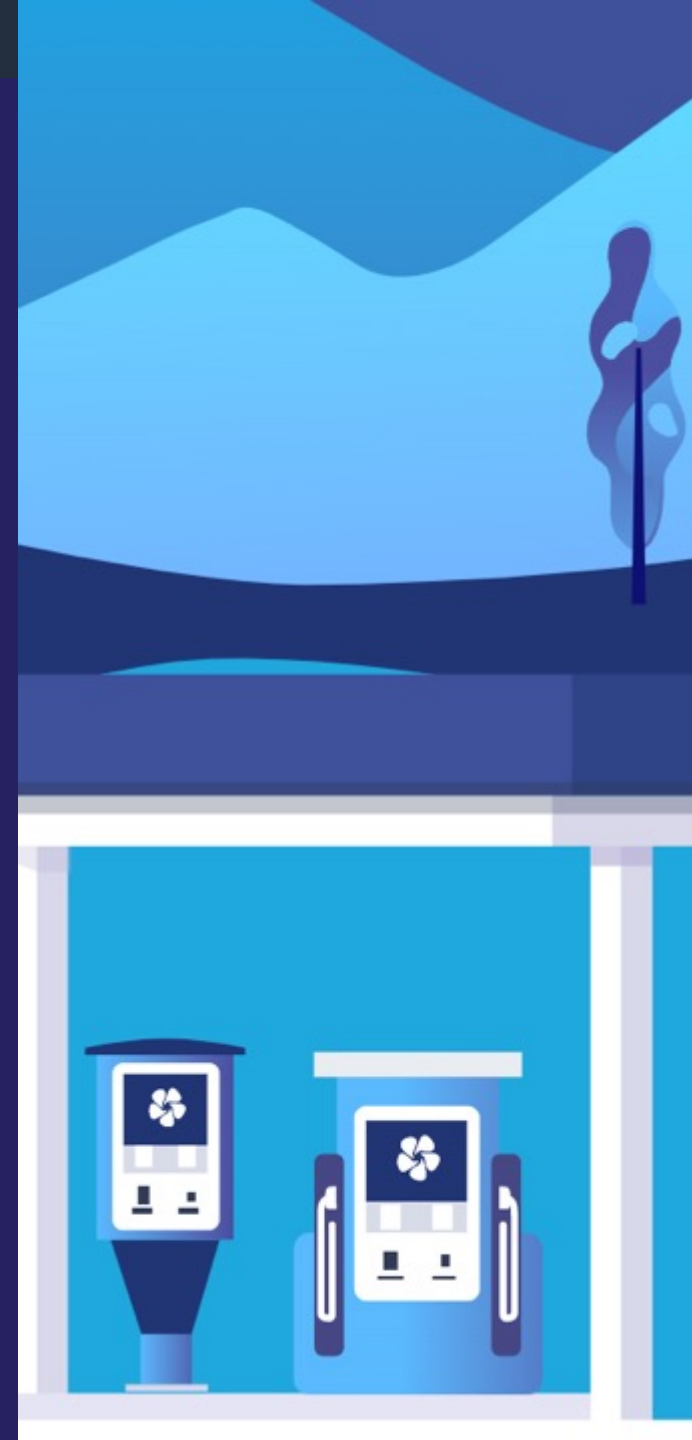
Pentasoft develops and deploys connected solutions for retailers that want real-time, accurate insights into their stores' operations. Digitalization is the new normal for consumers, and many fuel retailers face the challenge to adapt to the new requirements of the market. Such change requires often technical knowledge, as well as upfront investments that are not always available for smaller businesses.

SOLUTION

With the solution Akron, Pentasoft.es offers a powerful, affordable, and scalable cloud-based platform that integrates scenarios that cover the end-to-end needs from energy retailers. The solution leverages AWS serverless solutions like AWS IoT, Amazon API Gateway, AWS Lambda, mobile technology, and more, with typical control, communication, and payment systems used in this industry segment.

IMPACT

The platform allows instant unlimited growth, so that small energy retailers can respond effectively to any need, to expand its network of fuel retail sites without having to make previous investments in systems infrastructure.





Problem

Water management is key to insure productivity and sustainability for agriculture, and the agricultural sector requires scalable and affordable plug & play automated intelligent water management system to reduce production costs, and insure sustainability.

Solution

With this solution, Spherag offers an end-to-end solution, that integrates sensors and actuators to a cloud-based solution built with AWS IoT core over 5G, S3, and more, to provide real time monitoring, and irrigation control using ultra low power solar powered devices. The platform leverages multiple inputs sources for data like flow rates, pressure, weather, satellite, and soil parameters, which allow their models to recommend adequate irrigation patterns for each type of crop

Outcome

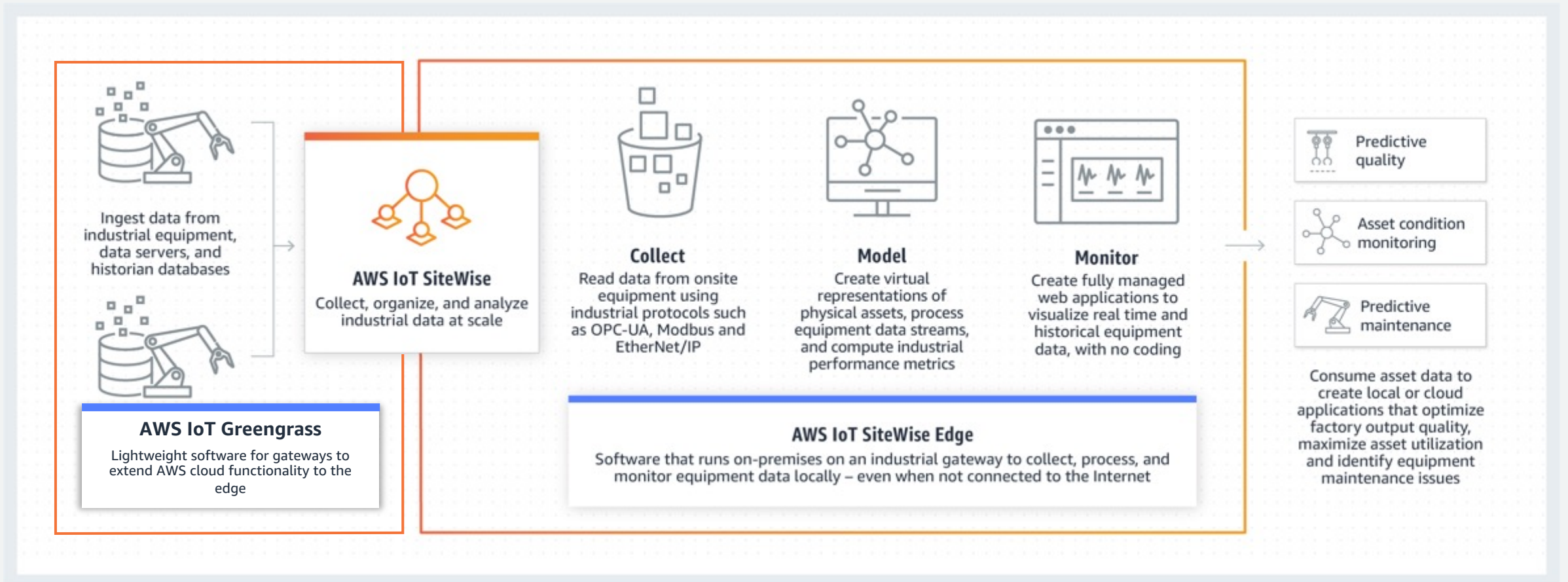
The platform provides a SaaS cockpit that provides real time management of fields, as well as a fully automated solution for water management that provides to their customers savings of up to 20% in water and energy.

“AGRICULTURE AS A SERVICE”

1 Trademark.

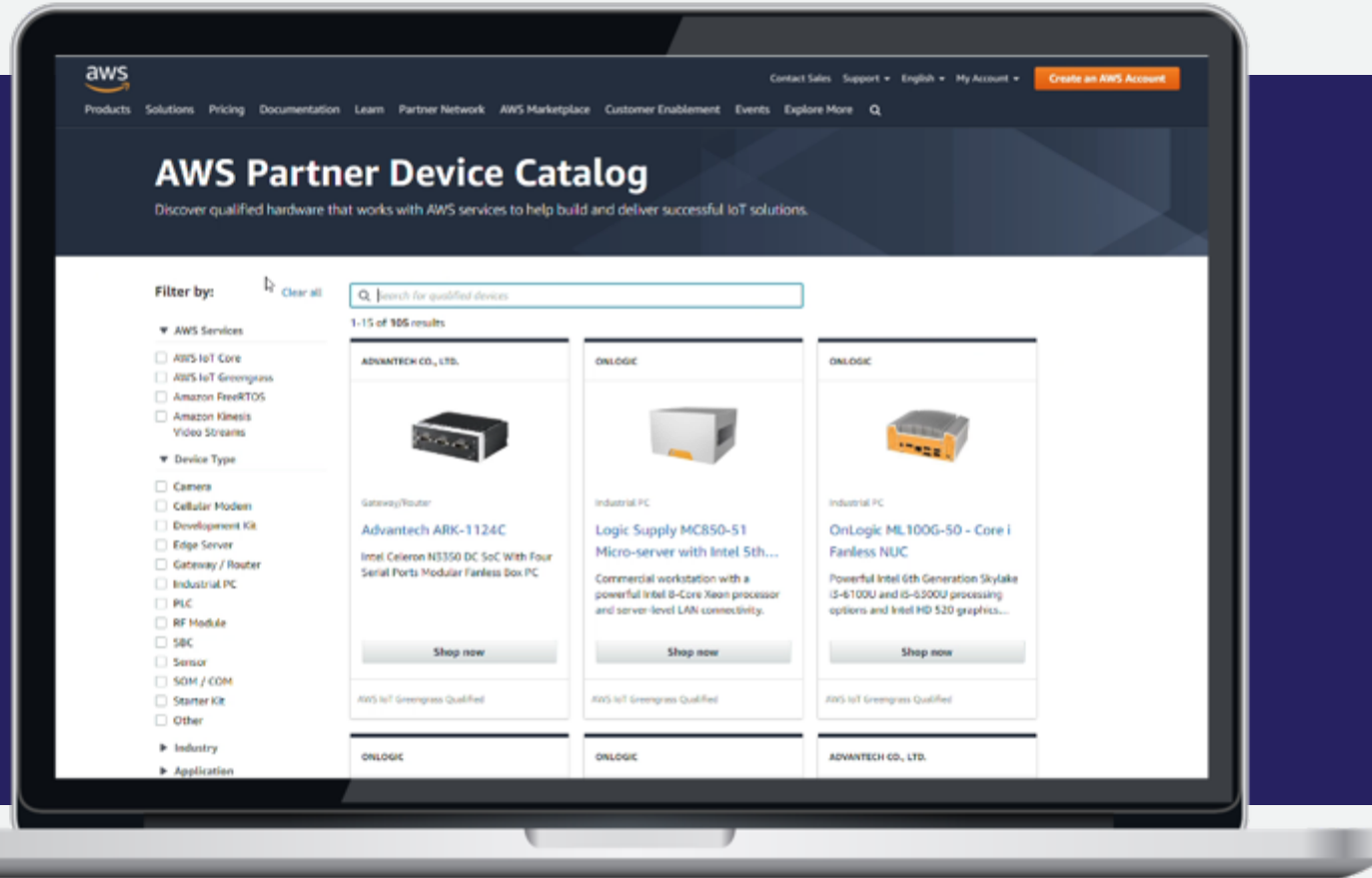
How can I securely connect my devices to the cloud?

How we connect to the cloud



AWS Partner Device Catalog

Discover validated Partner hardware and devices that are qualified to work with AWS by default.



700+

Qualified IoT devices in the Partner Device Catalog.

<https://devices.amazonaws.com/>



Examples of Siemens compatible devices

SIEMENS



Industrial PC (IPC)

SIMATIC Rack-PC IPC847E

The Siemens SIMATIC IPC847E offers the most powerful industrial PC technology in a newly developed, rack-mountable industrial design.

[Shop now](#)

Qualified for AWS IoT Greengrass

SIEMENS



Industrial PC (IPC)


SCALANCE LPE9403

Industrial IoT Device SCALANCE LPE9403 (AWS IoT Greengrass v2 qualified)

[Shop now](#)

Qualified for AWS IoT Greengrass

SIEMENS



Industrial PC (IPC)


SIMATIC Panel PC IPC477E

Powerful SIMATIC embedded panel PC for reliable, maintenance-free operation and integration flexibility in industrial applications.

[Shop now](#)

Qualified for AWS IoT Greengrass

SIEMENS



Programmable Logic Controller (PLC)

Siemens LOGO! 8.3 Logic Module

Modular, expandable, cloud connected logic module with relay outputs, digital/analog I/O, and expansion...

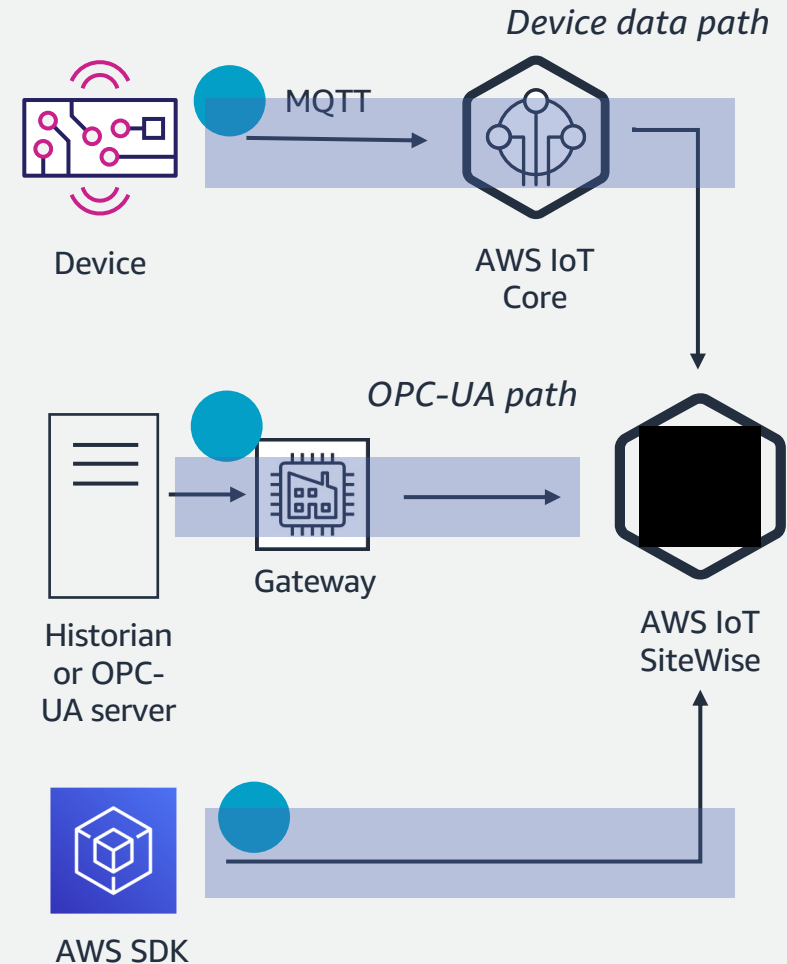
[Shop now](#)

Qualified for AWS IoT Core



Ingest Data

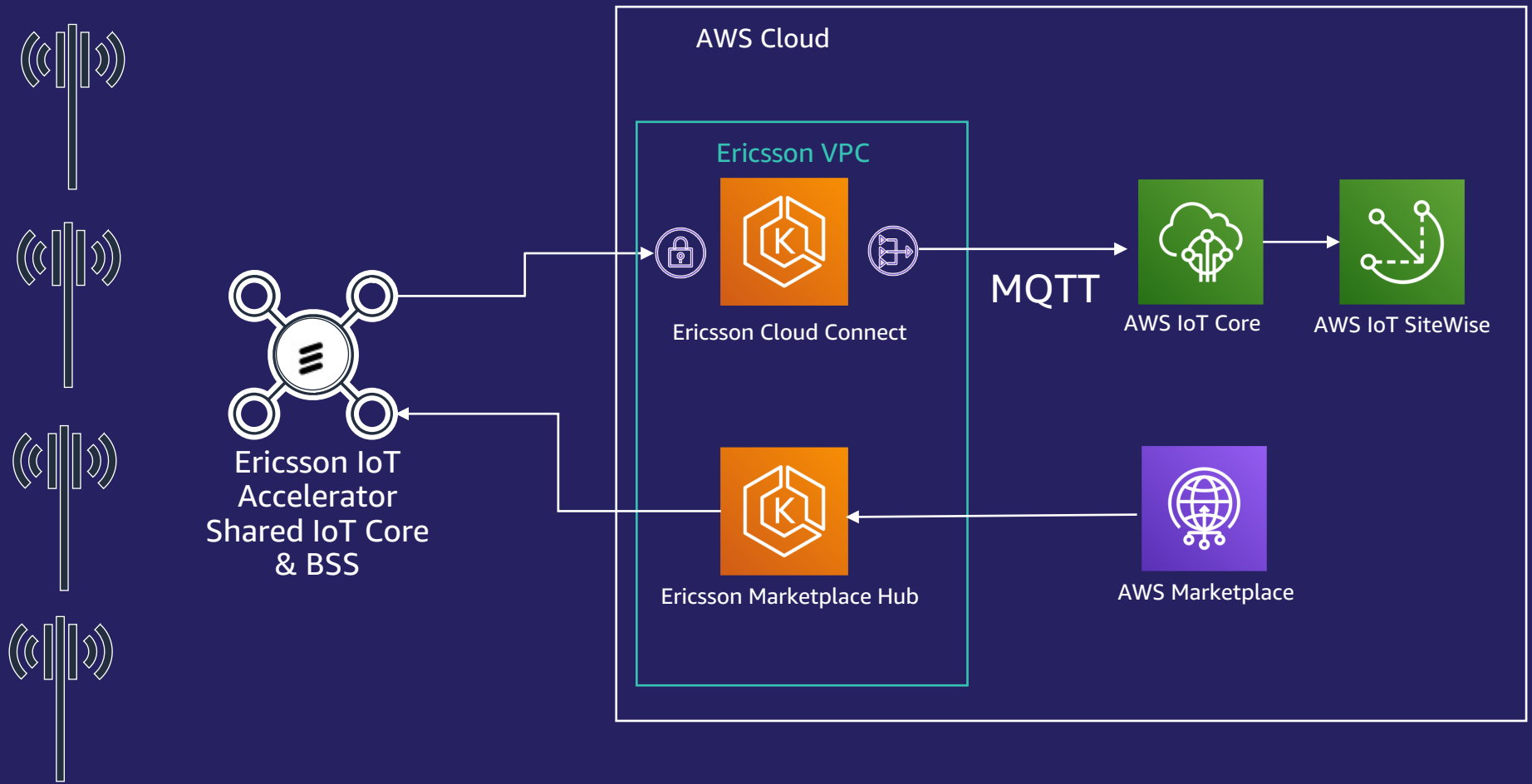
- Collect data from devices, equipment, and historians across all sites
- Send data to AWS IoT SiteWise from AWS IoT Core and through PUT APIs
- Supports MQTT, OPC-UA, EtherNet/IP, and Modbus protocols
- Centrally manage edge gateways



What about if I need my own communication channel?

The Ericsson IoT Accelerator AWS Toolkit (nb-IoT)

35 Carriers
100 Radio Networks
40,000 roaming agreements
100 million devices
7000 enterprises



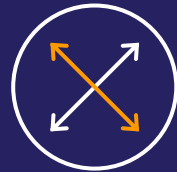
What about security?

Key elements of AWS IoT security



Unique Identity
and
Secure network
Communication

AWS IoT
IAM
MQTT & HTTPS



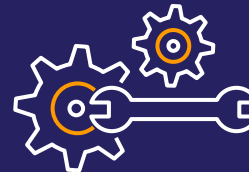
Authorization
and
Access control

IoT Policies
IAM Policies



Patching
Remote access
Onboarding

IoT Device
Management
Systems manager



Encryption
Transit
Rest

TLS 1.2
KMS



Auditing
and
Monitoring

CloudWatch
CloudTrail
Device Defender
GuardDuty



Alert
and
Mitigate

IoT Device
Management
Device Defender
SNS

AWS multi layered security approach and services

AWS IoT Device Defender ML Detect



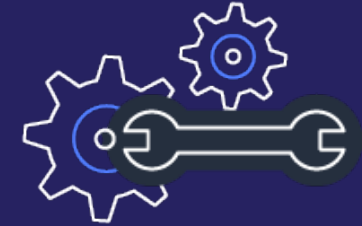
Enables
onboarding
Detect quickly



No prior device
behavior
knowledge
required



Adjusts to
device data
continuously



Provides
predefined
mitigation
actions

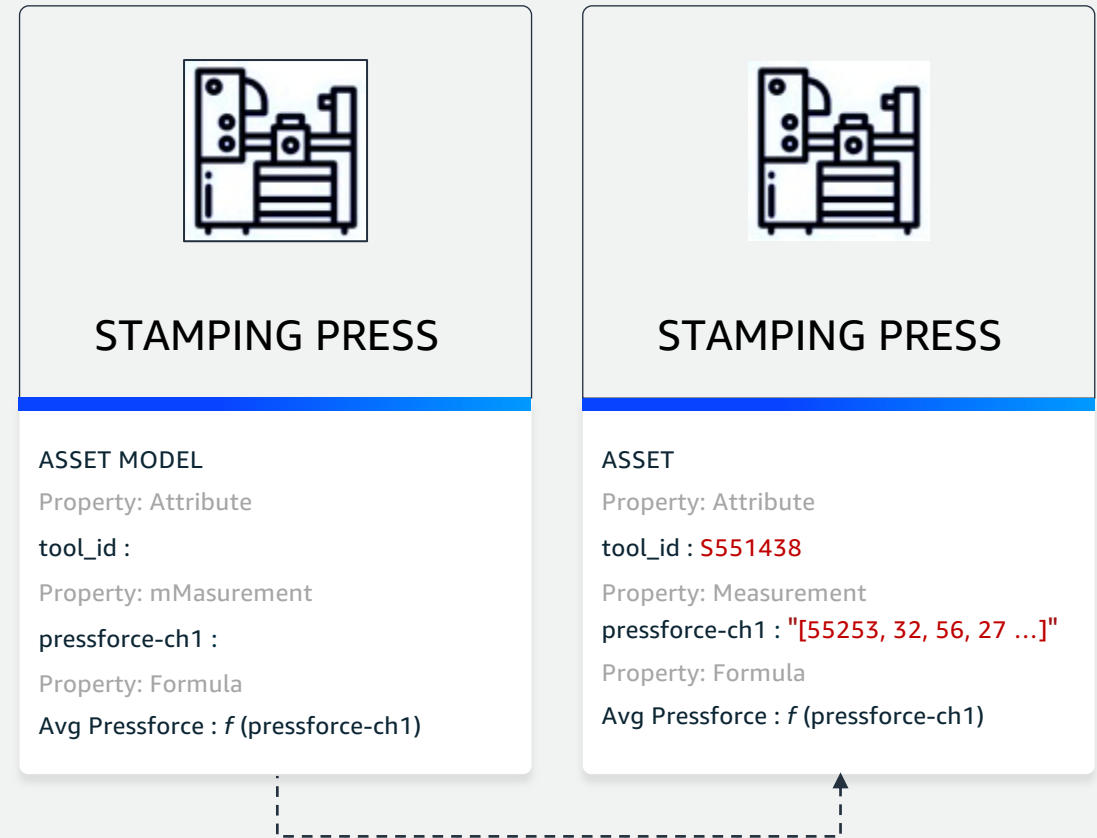
Industrial IoT configurable solution



Model Assets

Create virtual representation of physical assets

- Model equipment by creating asset models and assets
- Model production facilities by defining asset hierarchies and associations
- Define properties and formulae-based metrics for asset models
- Equipment data and computed metrics stored instantly





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)

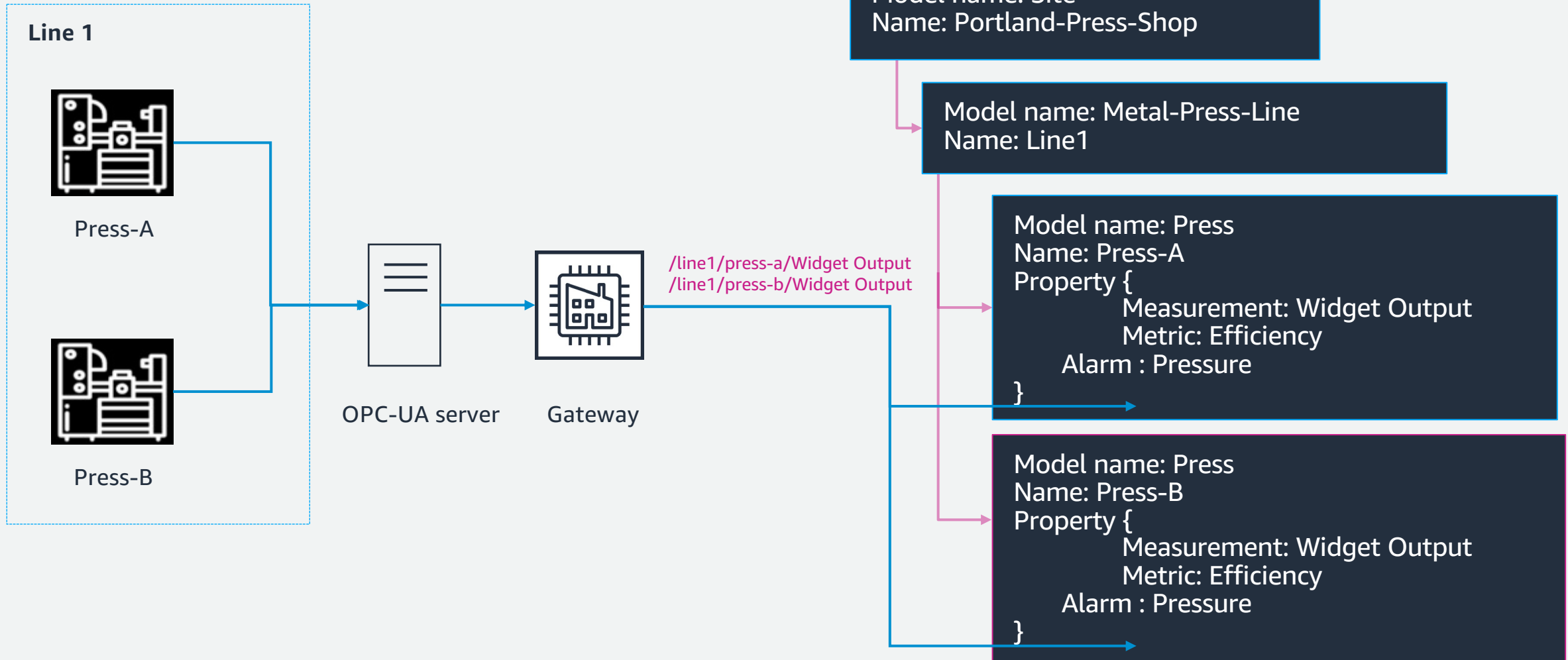
```
Model name: Press  
Name: Press-A  
Property {  
  Measurement: Widget Output  
  Metric: Efficiency  
}
```

Instance of an asset (Press-B)

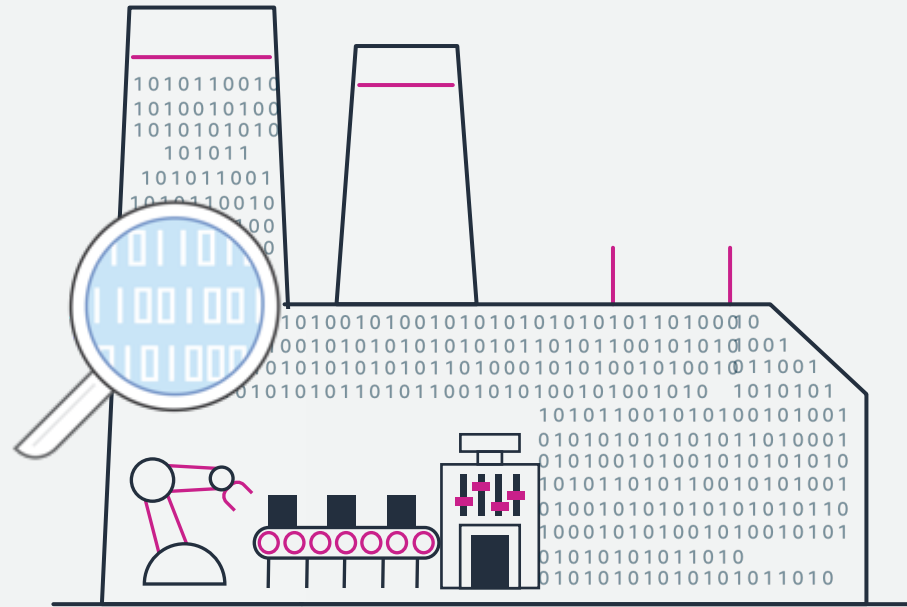
```
Model name: Press  
Name: Press-B  
Property {  
  Measurement: Widget Output  
  Metric: Efficiency  
}
```



Link measurements to assets



How can I gain insights into machine data?



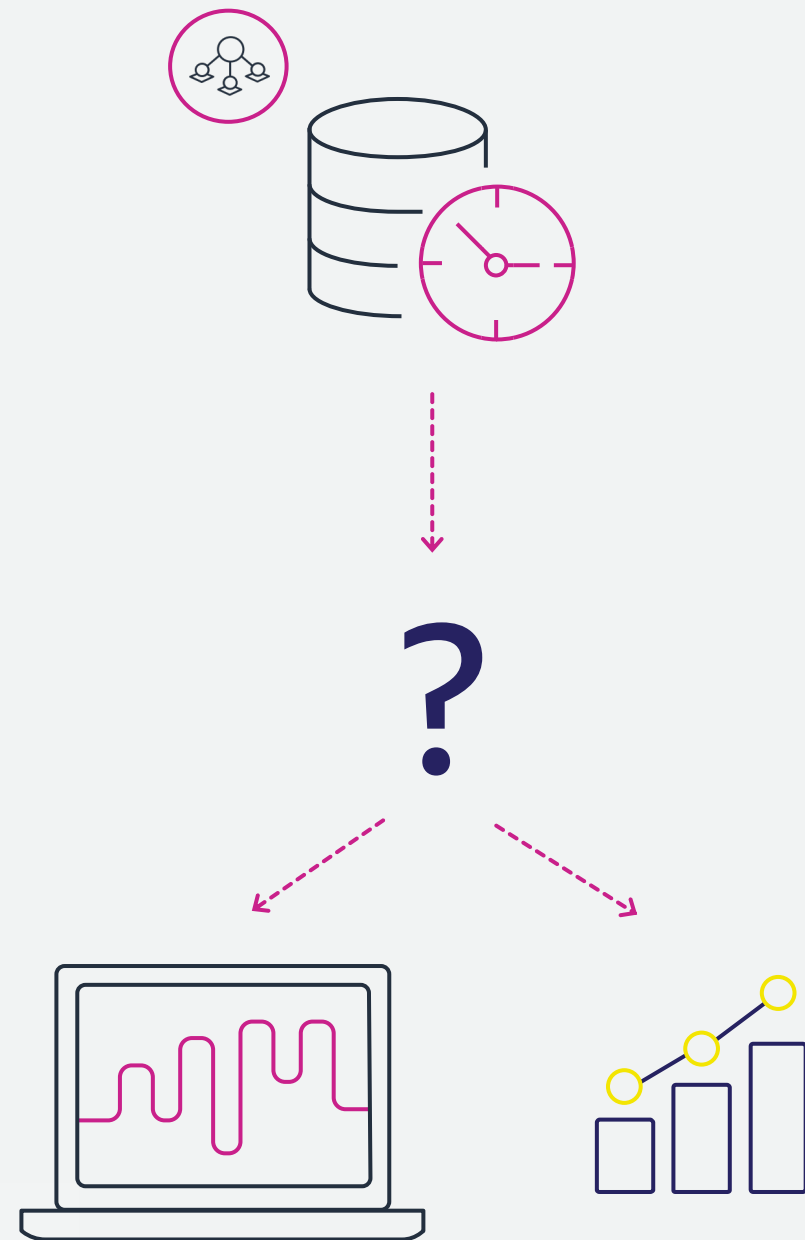
Store Asset Data

Store data in time series
optimized data store

Scalable, performant and
managed time series data store

Publisher/subscriber interface
to access latest value of
properties & metrics

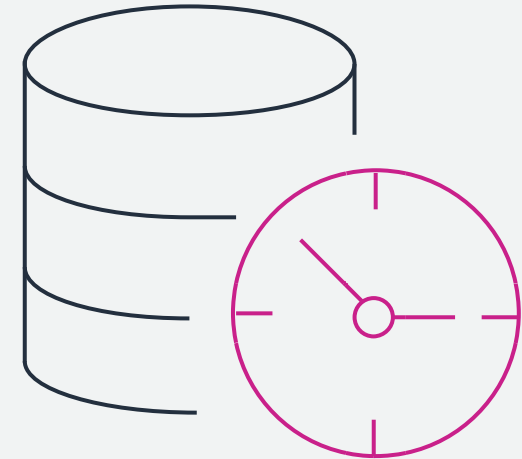
Query APIs to access historical
values for properties and
metrics for specific time range





Store time series data

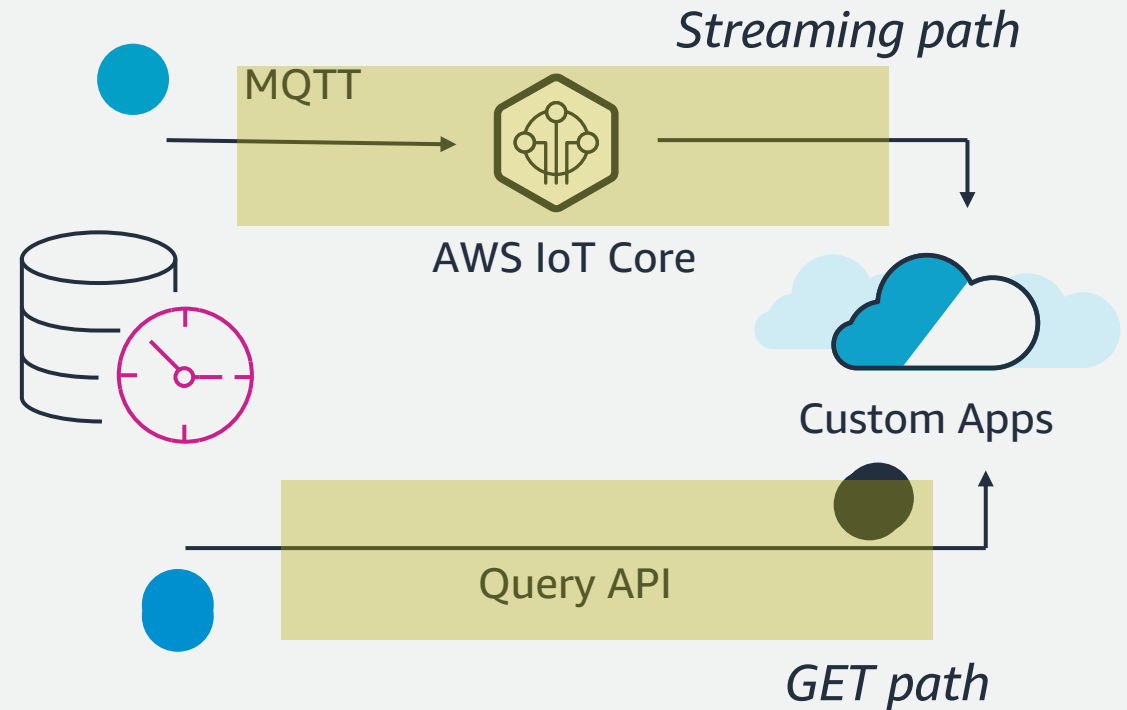
- Scalable, performant, and managed time-series data store
- No capacity planning or provisioning needed
- Low latency access to equipment data and computed metrics





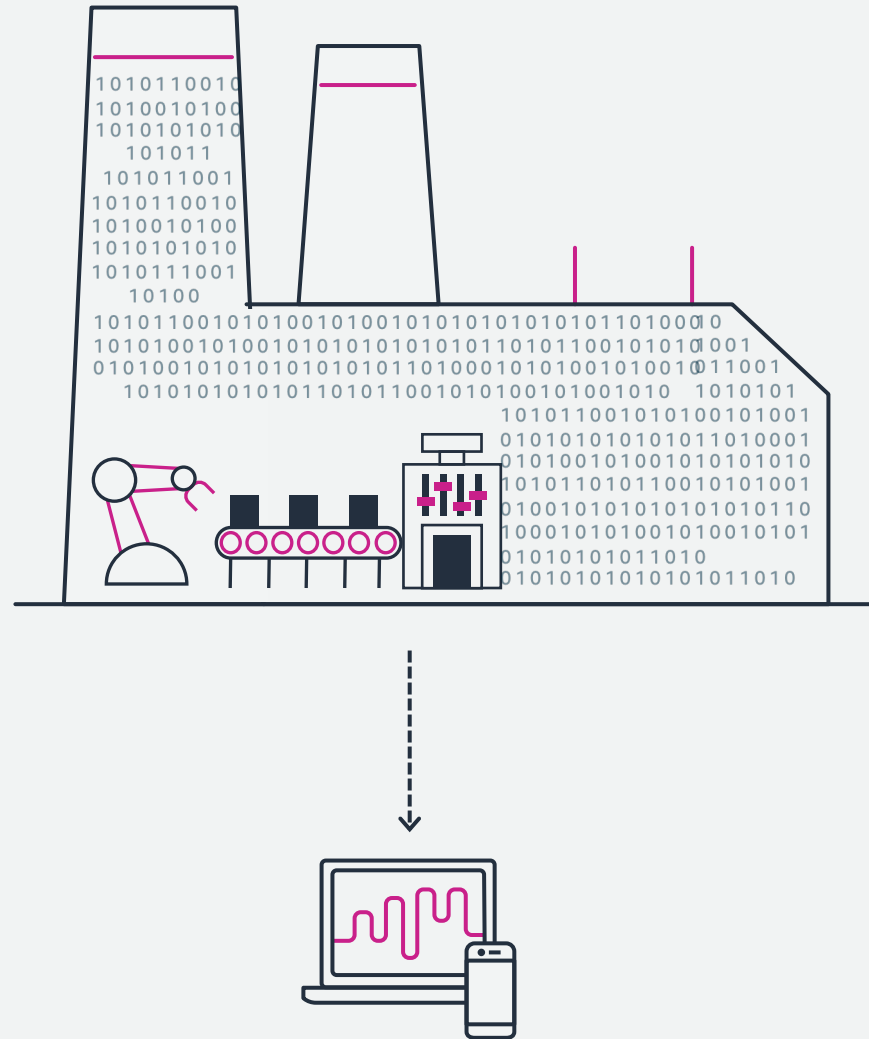
Retrieve data

- Publish-subscribe interface streams updates to asset properties to an MQTT topic
- GET APIs to query historical values of properties and metrics



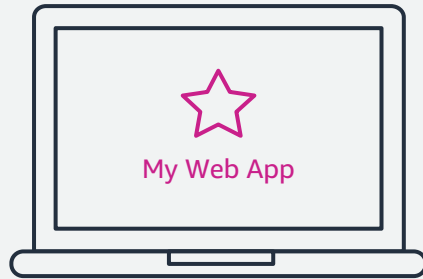
Analytics
Services

How can visualize, interact with, and share machine data?



SiteWise Monitor

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



Set up and deploy web applications for visibility into industrial machine data in minutes, without writing any code.



Automatically discover, add context and visualize data from industrial assets, and receive alerts by setting up threshold based alarms on SiteWise data

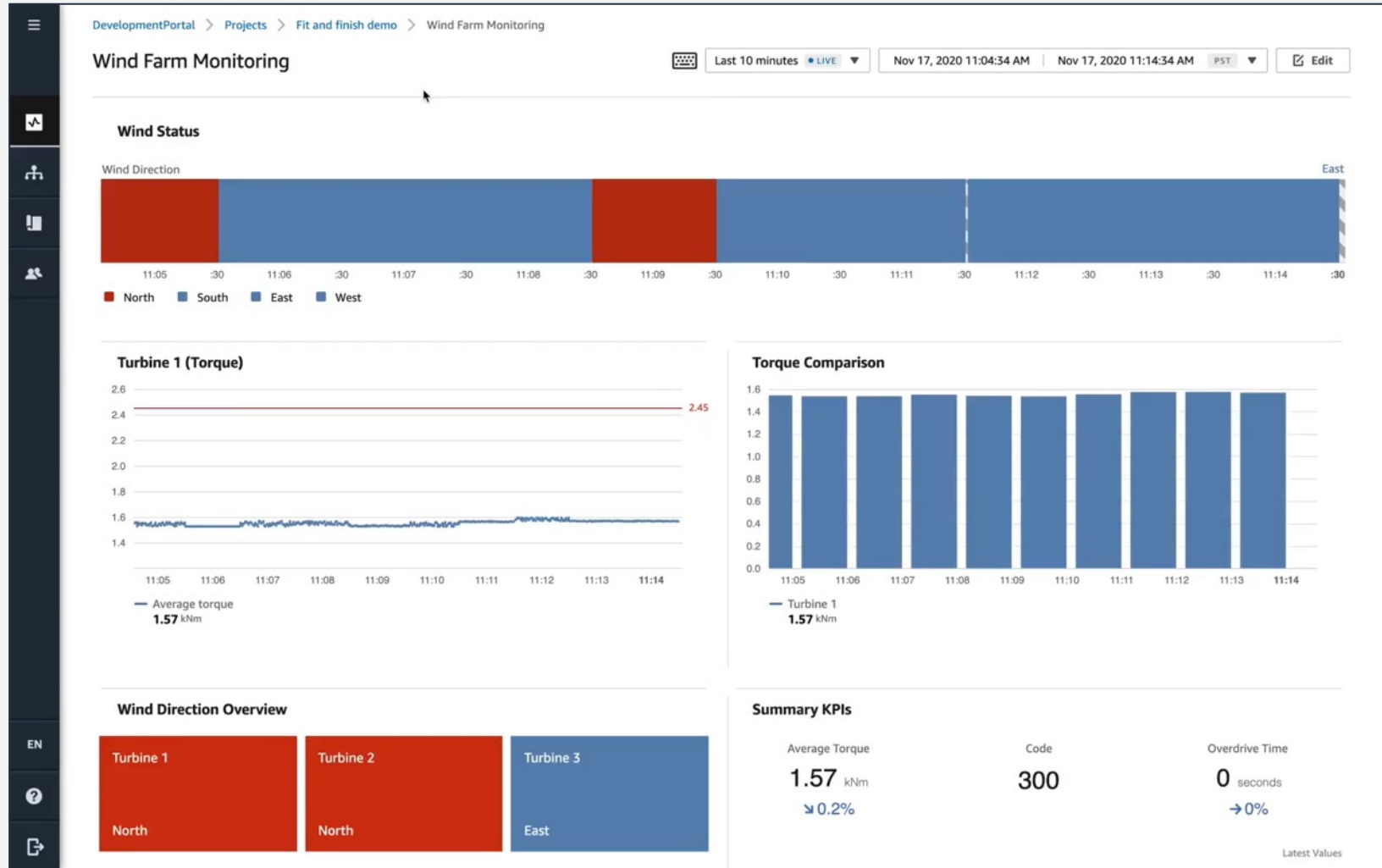


Easily share access to industrial data with any team in your organization to accelerate insights.



Analytics
Services

SiteWise Monitor



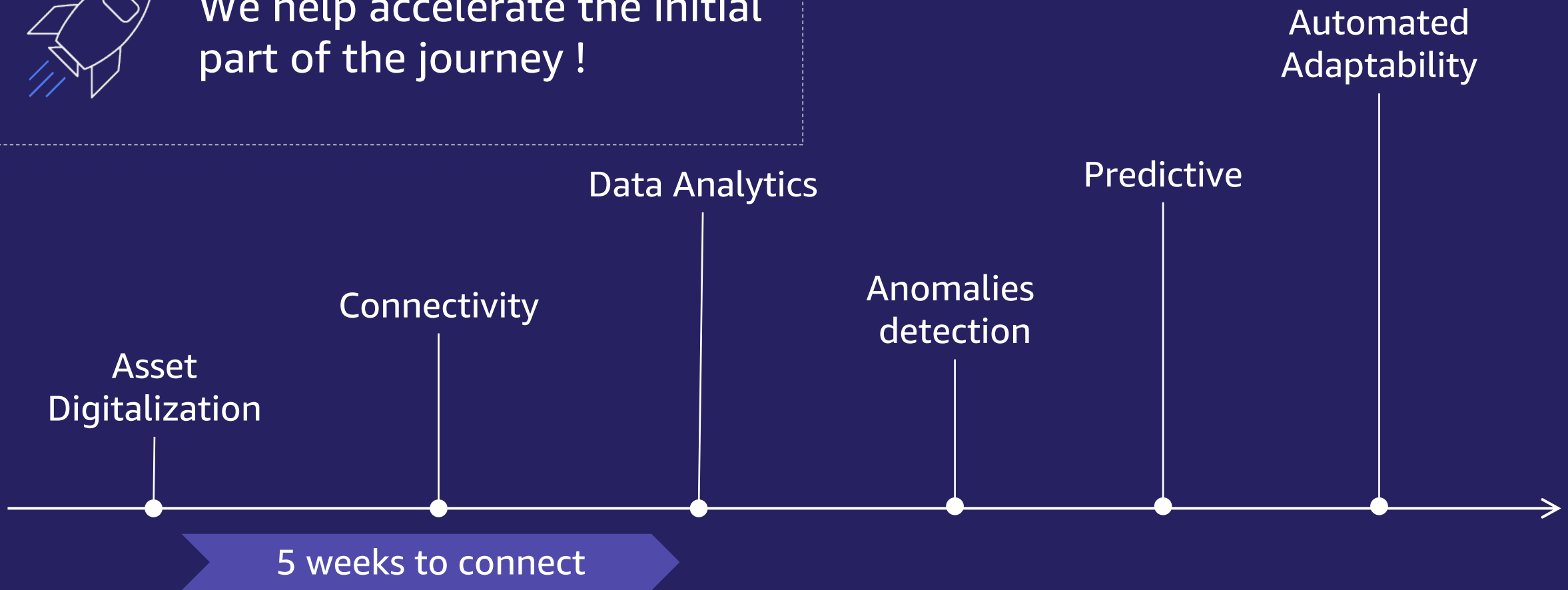
How to start?



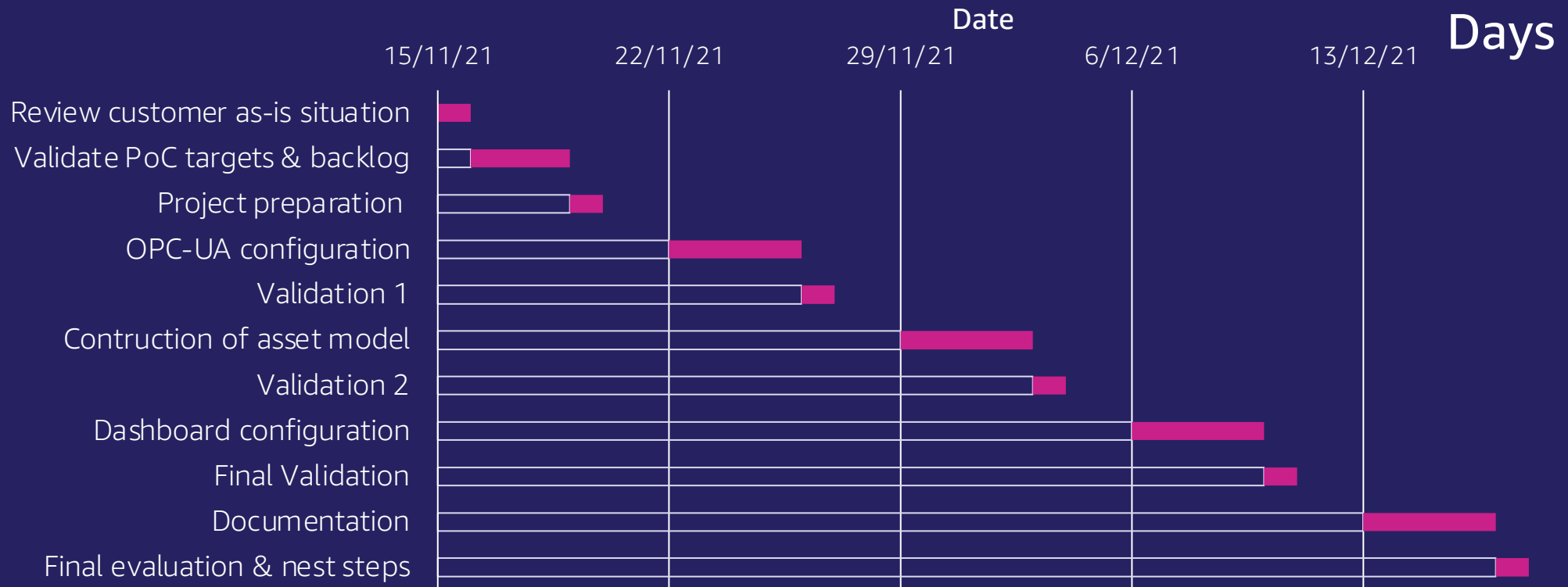
Industrial IoT Journey



We help accelerate the initial part of the journey !



Sample project timeline for getting insights on IIoT data



Disclaimer: this project is just indicative and should be adjusted accordingly to requirements



AWS IoT SiteWise

Official AWS pages

- Learn more, go to the solution landing page in AWS here: more info [here](#)
- AWS IoT SiteWise documentation pages : more info [here](#)
- You can use the following tutorials to work with AWS IoT SiteWise: more info [here](#)
- The industrial Machine Connectivity Solution with AWS IoT: more info [here](#)
- AWS IoT SiteWise relies on [AWS IoT Greengrass](#) edge component from AWS. Find 350+ compatible devices in our partner device catalog [here](#).

Video tutorials

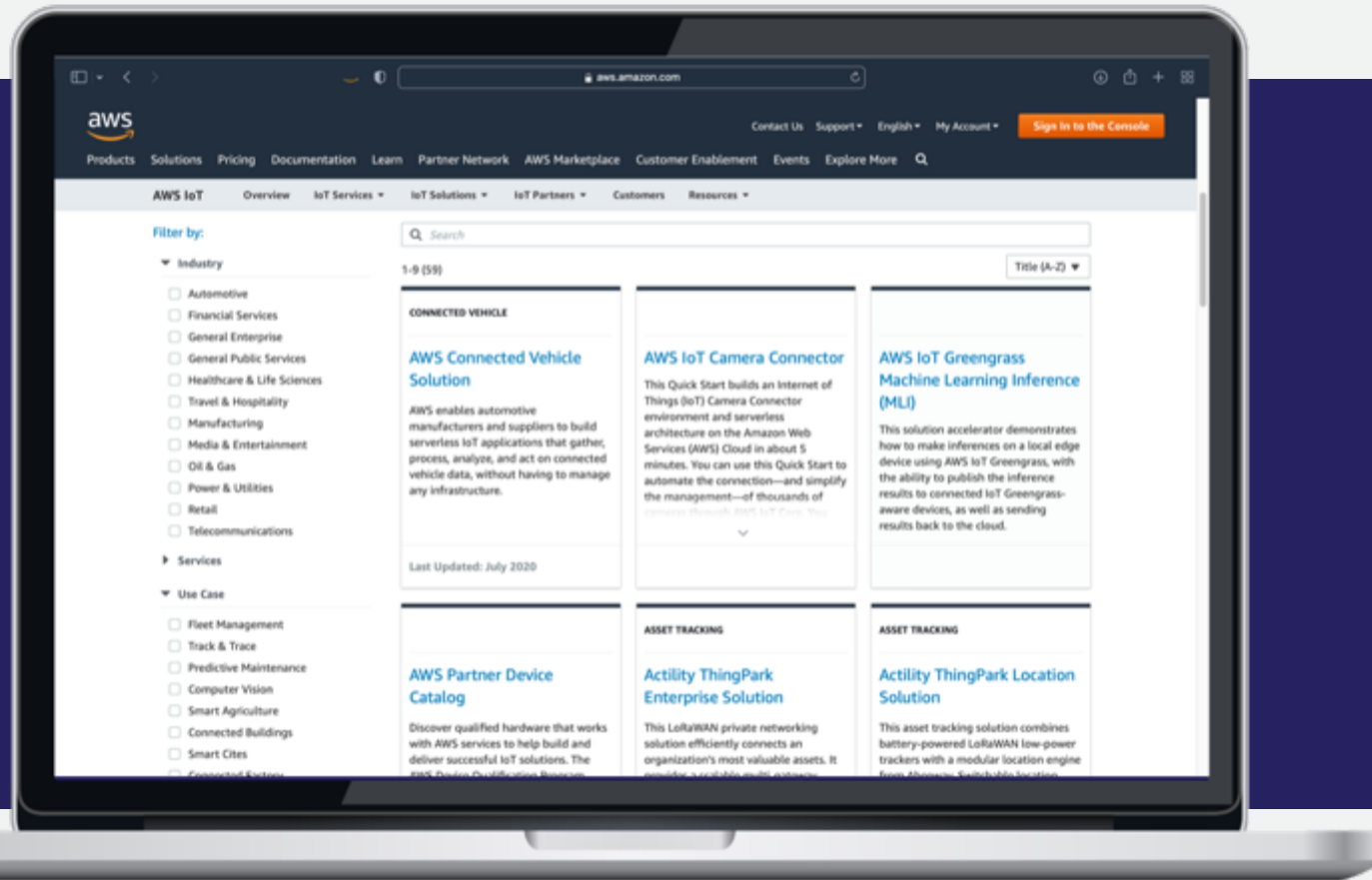
- Part 1: Introduction to asset creation and modelling (7 min): [link in YouTube](#)
- Part 2: Connecting to an industrial equipment data source and gateway configuration (11 min) [link in YouTube](#)
- Part 3: Asset modeling, hierarchies, metrics, and transforms (11 min): [link in YouTube](#)
- Part 4: industrial data visualization with SiteWise Monitor (12 min): [link to YouTube](#)

Partner solutions build on top of AWS IoT SiteWise

- [CloudRail](#): is a managed no-code solution that includes an industrial gateway that allows connecting IO-Link sensors to AWS cloud: more info [here](#)
- [Neuron](#): offers managed containers to deploy pre-configured virtual gateways that can be installed on any platform to connect sensors to AWS IoT SiteWise in minutes.: more info [here](#).
- [Advantech](#): offers industrial gateways with pre-installed software components that allow to integrate 200+ industrial protocols to AWS IoT Greengrass and AWS IoT SiteWise: more information [here](#).

AWS IoT Solution Repository

Quickly start building with solutions for industrial, consumer, and commercial use cases



50+

IoT Solutions

[IoT solutions repository](#)





Thank you!