Leveraging IoT at the Edge and Industrial Workloads (Level 300)

Kapil Pendse, Partner Solution Architect

If you knew the **state of every thing** and could **reason on top of that data…**

what problems would you solve?

Problem

As Konecranes specializes in the manufacturing and service of cranes globally, they discovered that when they needed to make updates to their machinery it meant downtime and local presence onsite.

Solution

Using AWS Greengrass has enabled them to deploy updates using cloud models that continually get smarter over time as they sync with the local environments.

Impact

This allows them to simplify their current crane architecture and make it possible to update calculations to the cranes in a secure way even after the installation has taken place.

Problem

Stanley Black and Decker finds it unsustainable to ingest, transmit, store, query and analyze all data generated at the edge and more specifically on construction sites or rural areas with constrained network resources.

Solution

AWS Greengrass enables Stanley Black and Decker to monitor and filter data at the edge of the network enabling applications to send asset health and predict any mechanical failures before they occur. Edge-based applications built on Greengrass will help detect and compare vibrations emitted by high value tools to historical signatures that indicate everything from normal operations to imminent failure.

Impact

Instead of trying to use all the data Stanley Black and Decker will utilize AWS Greengrass to focus on the right data. Applications include remote troubleshooting of hydraulic assets by technicians, maintenance interval tracking, fuel savings, and alerts.

AWS IoT Services

Things
Sense & Act

Endpoints

Amazon FreeRTOS

Gateway

AWS Greengrass

Cloud Storage & Compute & Learn

Secure device connectivity and messaging

AWS IoT Core

Fleet onboarding, management and SW updates

AWS IoT Device Management

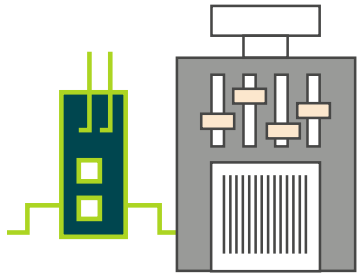
Fleet audit and protection

AWS IoT Device Defender

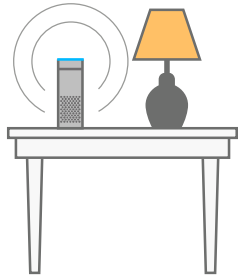
IoT data analytics and intelligence

AWS IoT Analytics

Who is AWS Greengrass for?



Industrial Gateways



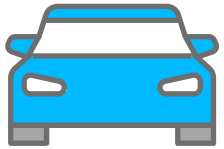
Consumer Electronics

Energy

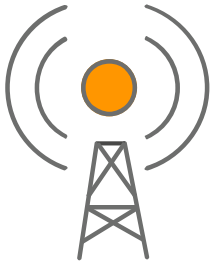
Retail

Medical

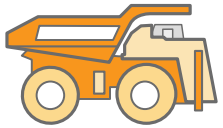
Construction



Automotive



Infrastructure



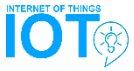
Mining

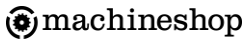
Agriculture

Insurance

More...

Greengrass Momentum





Problem

Nokia has seen a need in industrial IoT to analyze video streams at the edge and send the data to remote centers only when anomalies are detected.

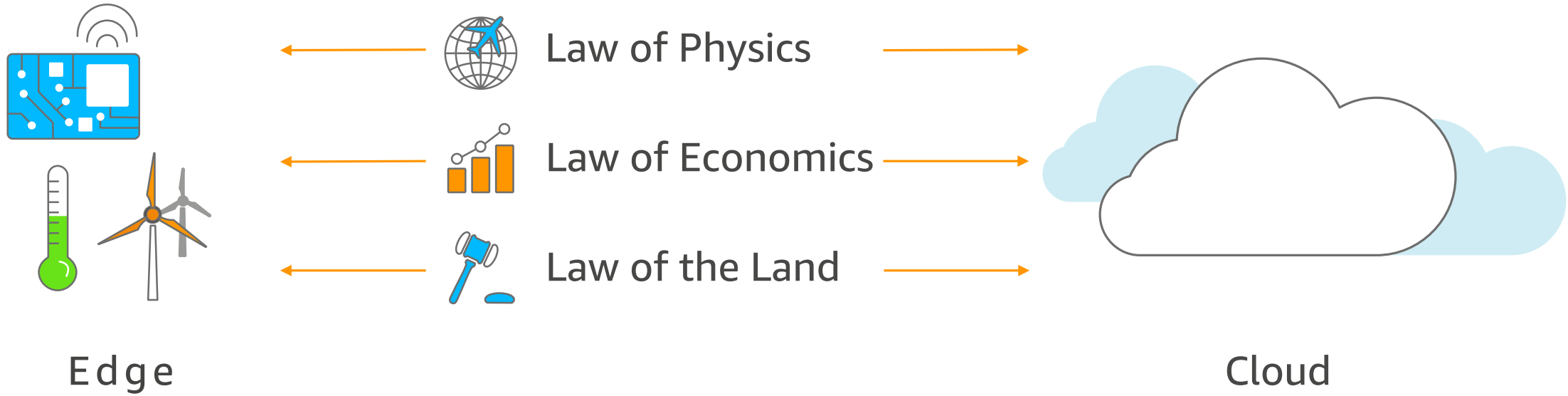
Solution

Deploying Greengrass on Nokia Multi-access Edge Computing platform and combining it with Nokia private mobile network solutions. This joint solution will make it possible for the oil industry to pair real time drilling data with production data of nearby wells.

Impact

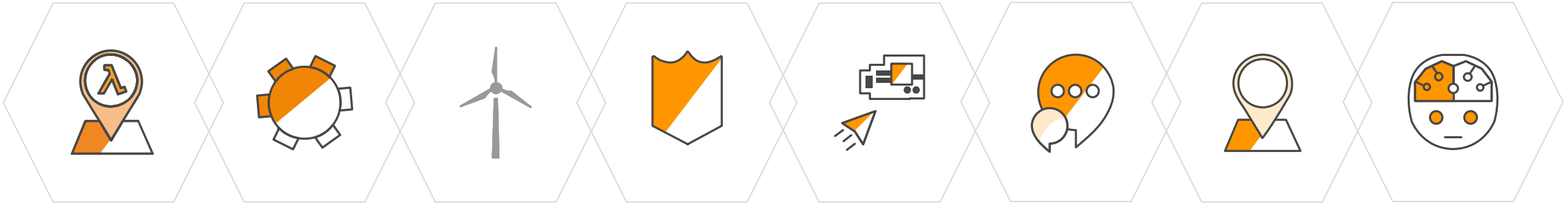
Due to the cost of bandwidth being expensive, this allows Nokia to optimize the data that is sent to other wells and to the cloud based on rules and alerts set up on the locally-processed data.

Where do I want to process data?



AWS Greengrass

Extend intelligence to the edge



Local actions

Local triggers

Data and state sync

Security

Over the air updates

Protocol adapter for OPC-UA

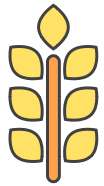
Local resource access

Local ML inference

Preview today

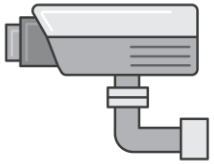
AWS Greengrass ML Inference - Use Cases

Self-driving cars

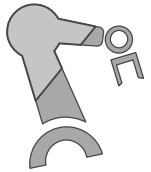


Smart Agriculture

Predictive maintenance



Video surveillance



Robotics

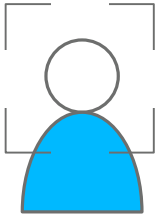
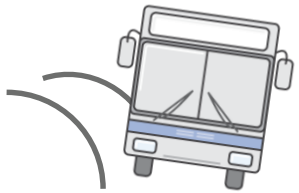
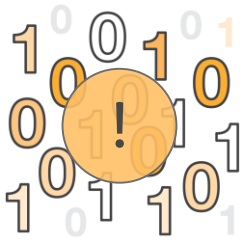


Image recognition

Voice/sound recognition



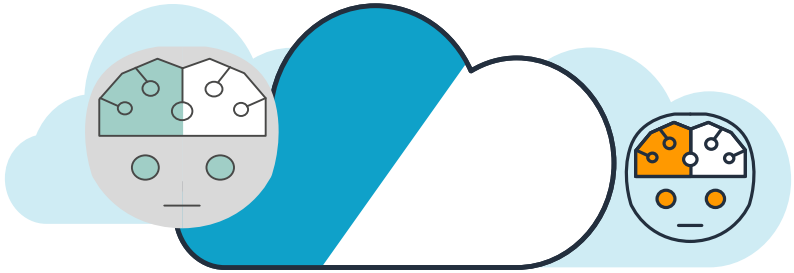
Collision avoidance



Anomaly detection

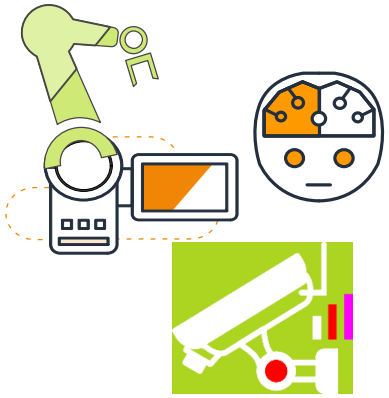
More

AWS Greengrass ML Inference

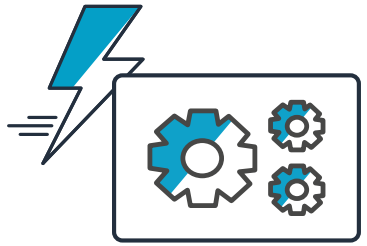


Build and train ML models in the cloud

Use Greengrass to deploy optimized models on your target device



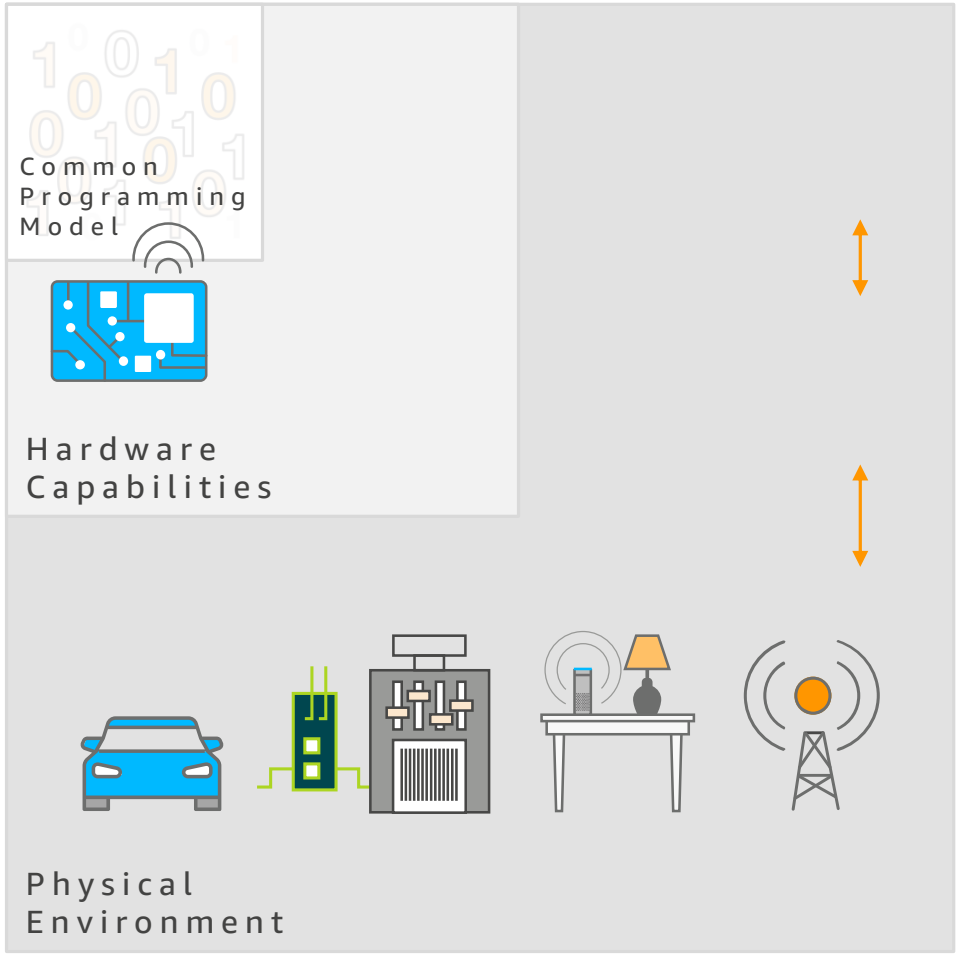
Accelerate ML inference applications on the edge



Devices take action quickly – even when disconnected

Local Resource Access

Local resources access



Lambdas
Triggers
Shadows

GPU
File System

Sensors
Actuators
Radios
Buses

Local Resource Access – examples

Use this…	for this…	…with this.
GPU	Hardware acceleration for machine learning	/dev/nvidia0
Serial	OPC-UA, CANbus and Modbus	/dev/ttyS0
USB	Wired peripherals (e.g., cameras)	/dev/bus/usb
GPIO	Sensors and actuators	/dev/mem
Folder	Access the local filesystem	/usr/lib/python2.x/site-packages/

OPC-UA

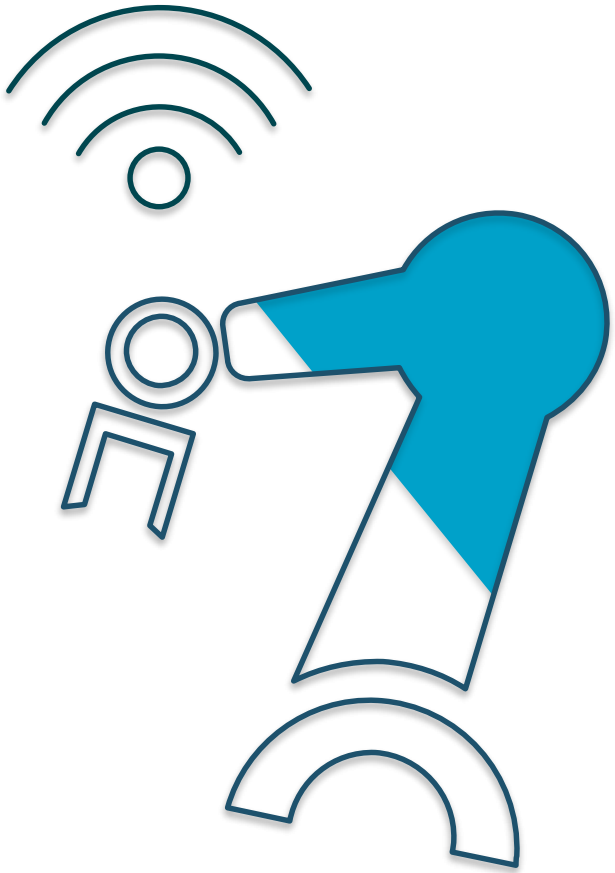
Information Exchange
for industrial communication

Secure with Certificate
Based Authentication

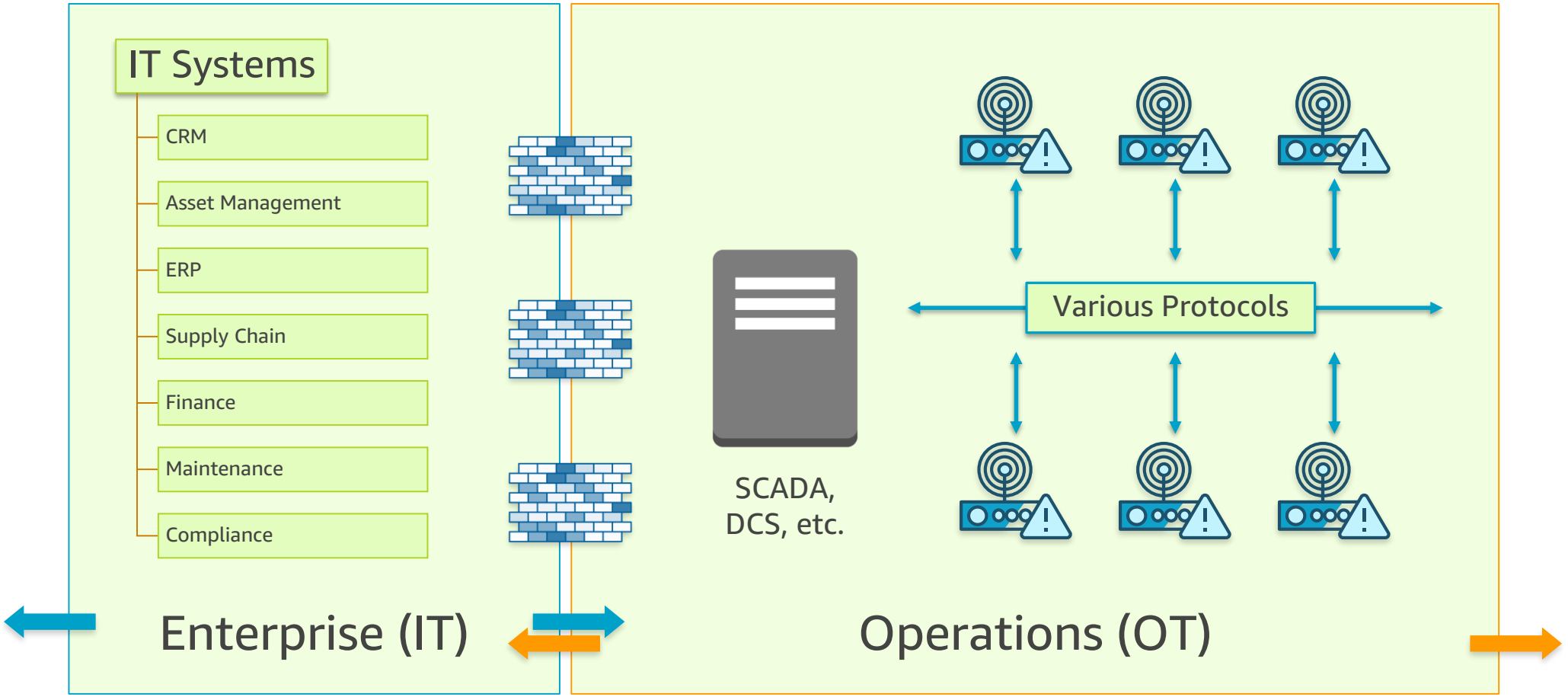
Fully
Customizable

Industry 4.0
What's changed?

- Increasing need to optimize and predict system performance
- Need for geographically scattered assets that function together
- Mix of legacy and new equipment

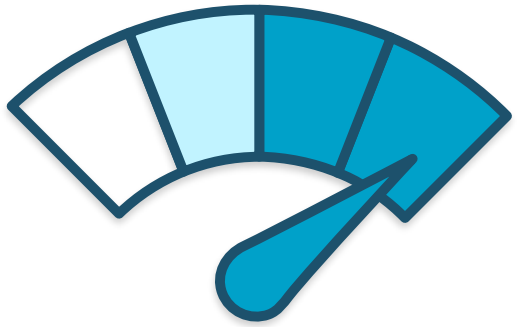


Challenge: Brownfield Environments



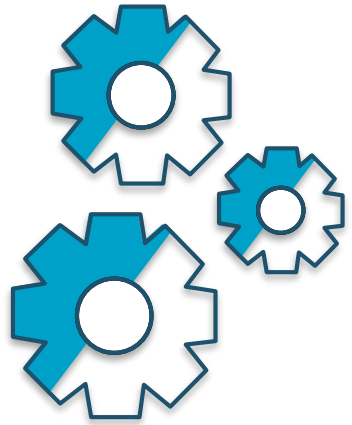
Opportunities

IoT Drives Manufacturing Innovation



Here-and-now
Real-time Remote
Monitoring

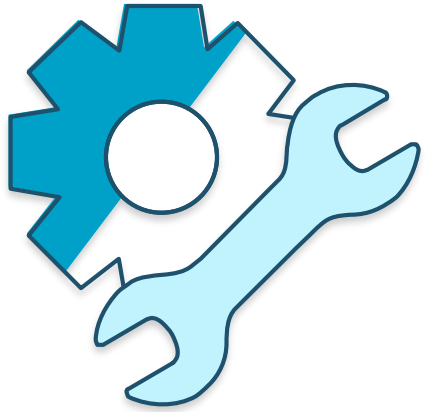
Predictions,
Machine Learning,
and Edge AI



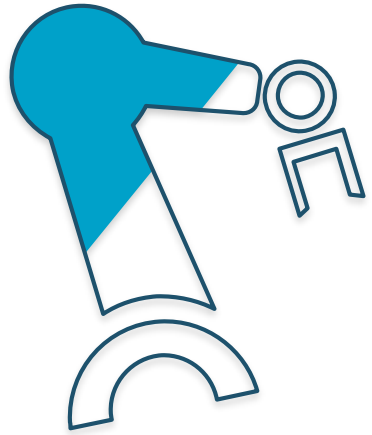
Smart Factory
Closed Loop Automation
and Intelligence

Popular Industrial IoT Use Cases

Asset Condition Monitoring



Predictive Maintenance

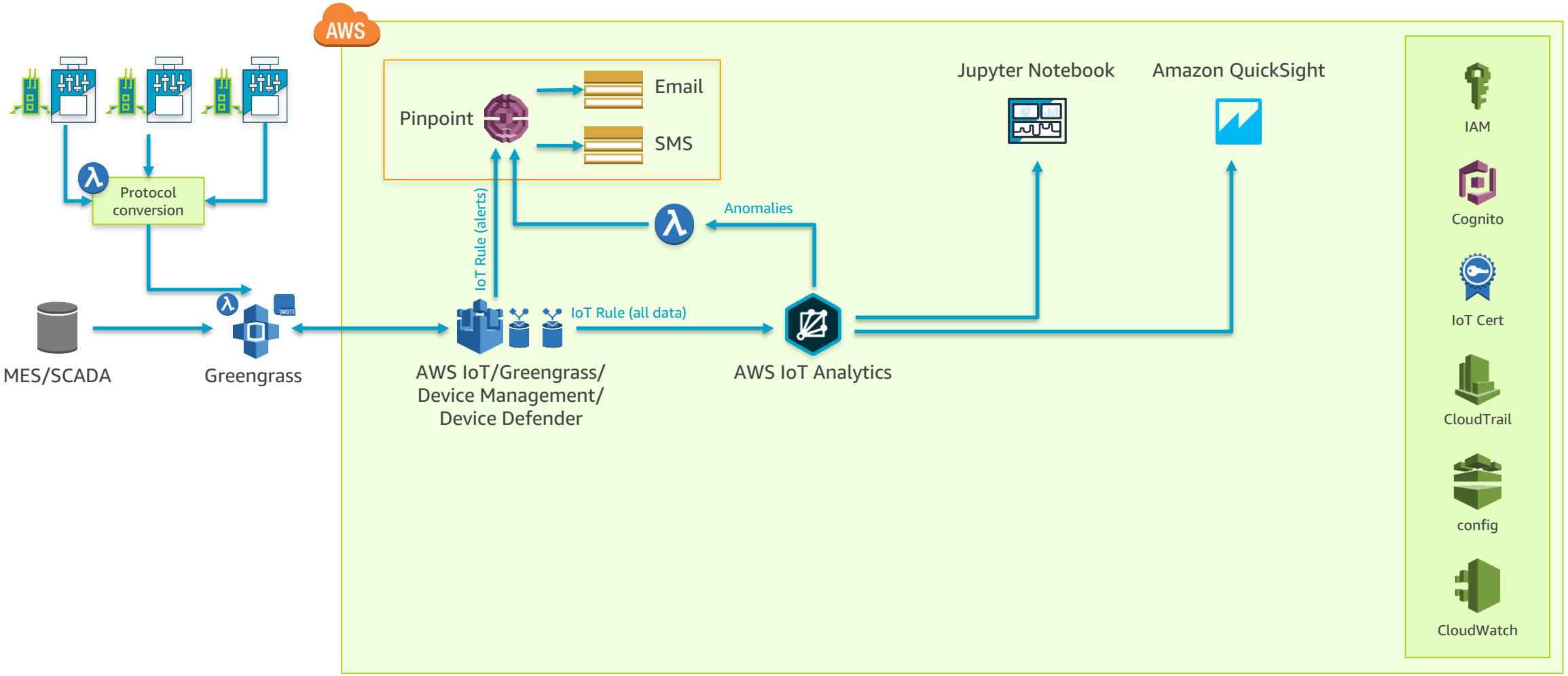


Predictive Quality

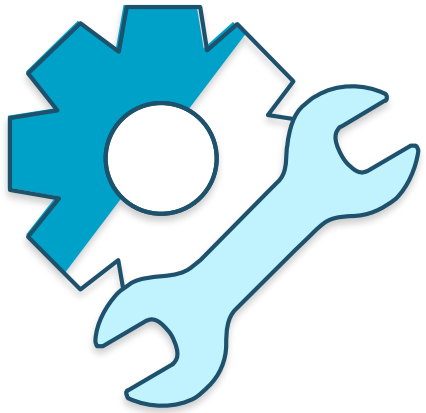
Use Case
Asset Condition Monitoring

Monitor and scale industrial equipment and understand asset condition for one or more monitored parameters of assets

Condition Monitoring Architecture
with AWS IoT Analytics

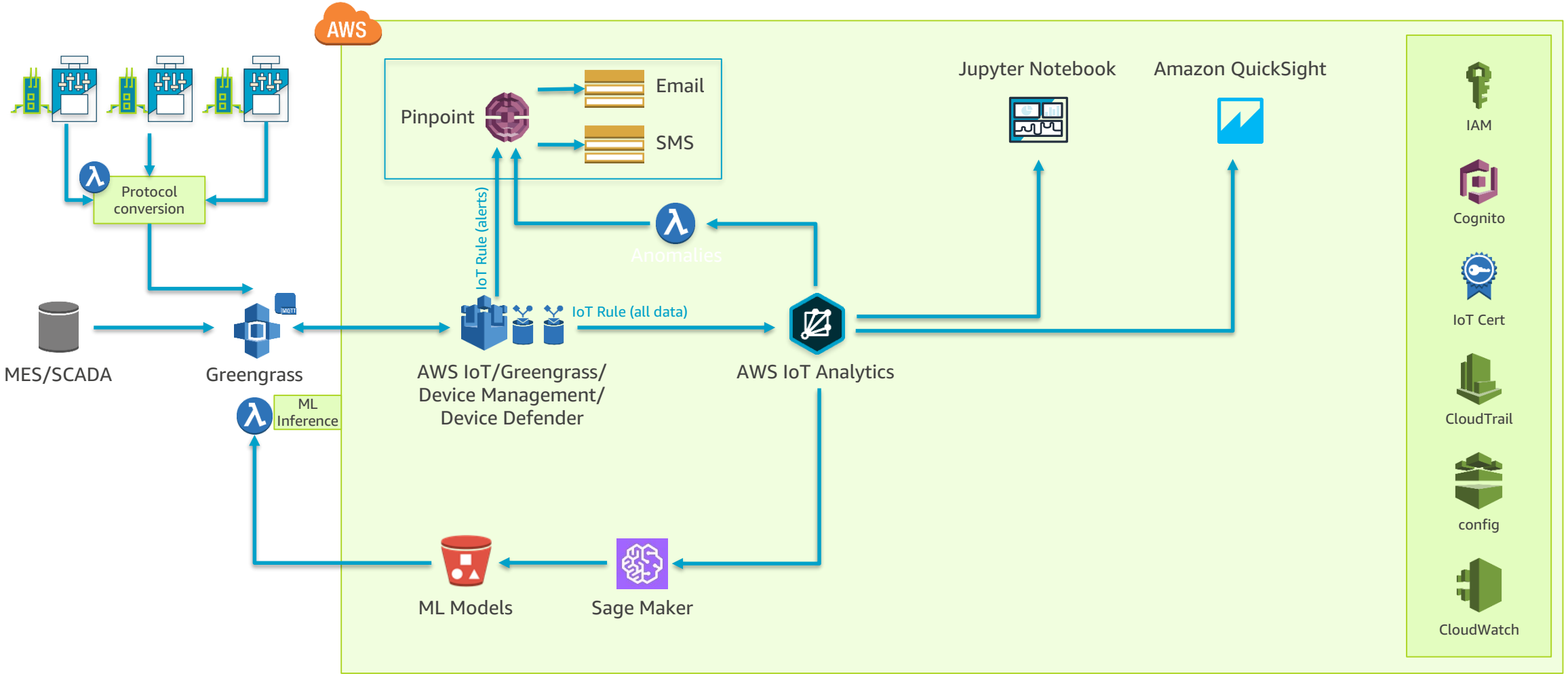


Use Case
Predictive Maintenance

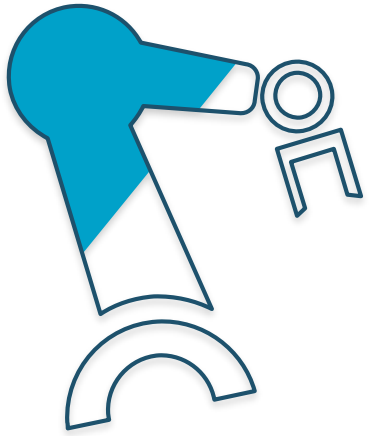


Understand current health of equipment and predict machine failure before business operations are impacted

Predictive Maintenance Architecture
with AWS IoT Analytics

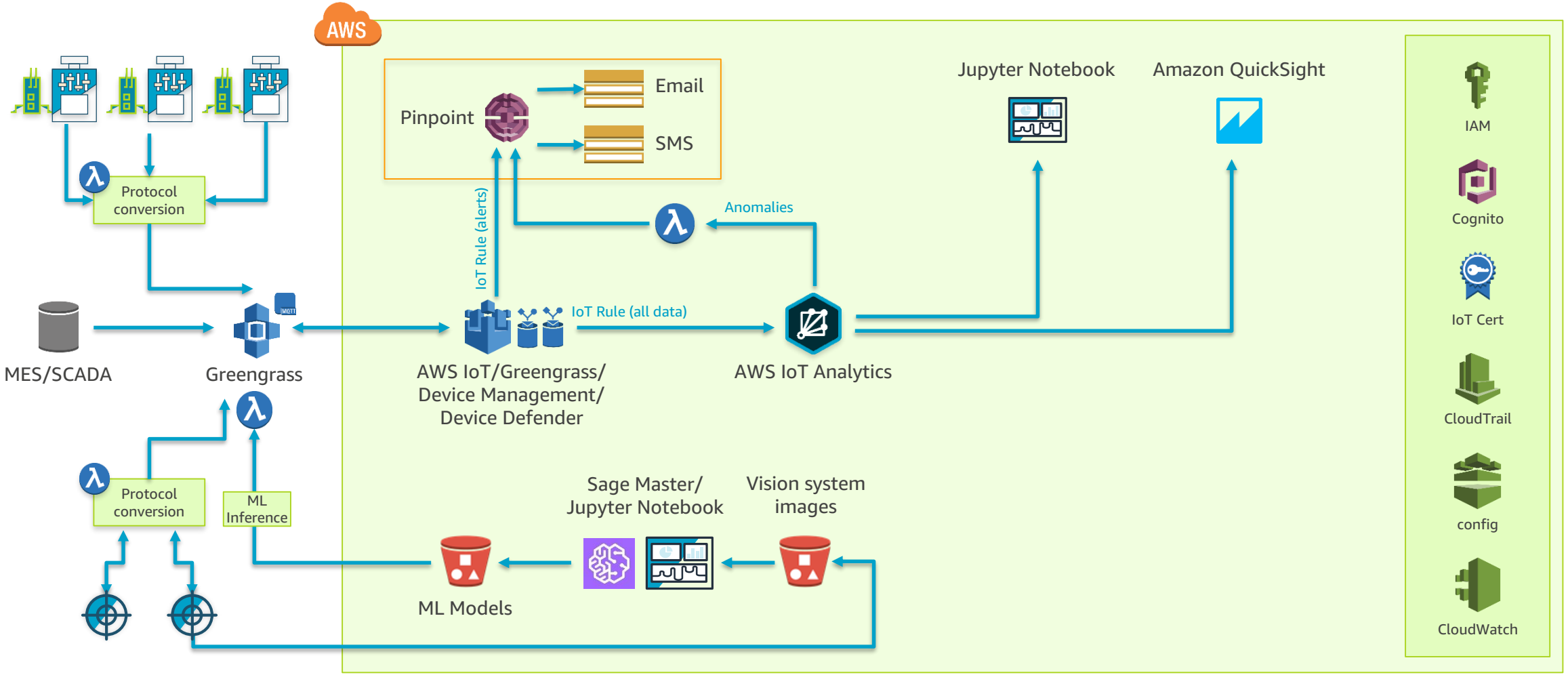


Use Case
Predictive Quality



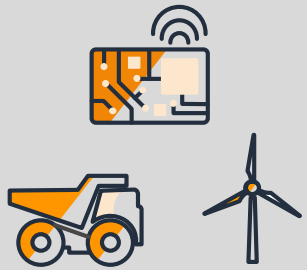
Quickly pinpoint product quality issues related
factory output, rather than equipment performance

Predictive Quality Architecture
with AWS IoT Analytics



Industry 4.0 solutions are complex & multidimensional

Onboard, provision, manage



Devices & sensors

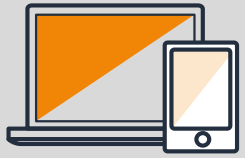
Connect, communicate, secure

Connectivity & infrastructure

Analyze, visualize, act

Analytics & insights

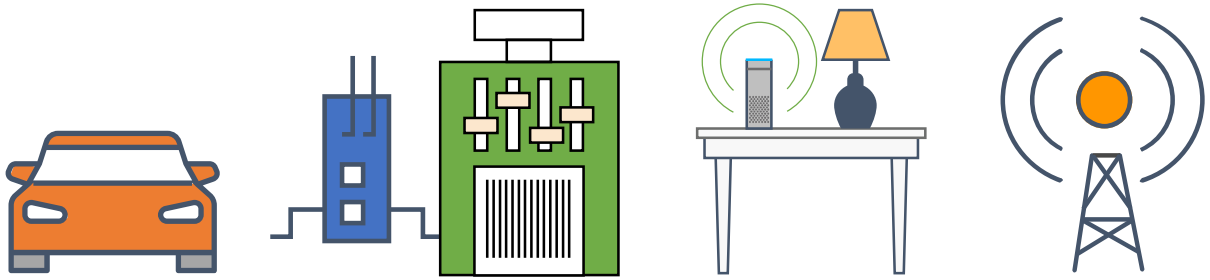
Engage, empower, delight



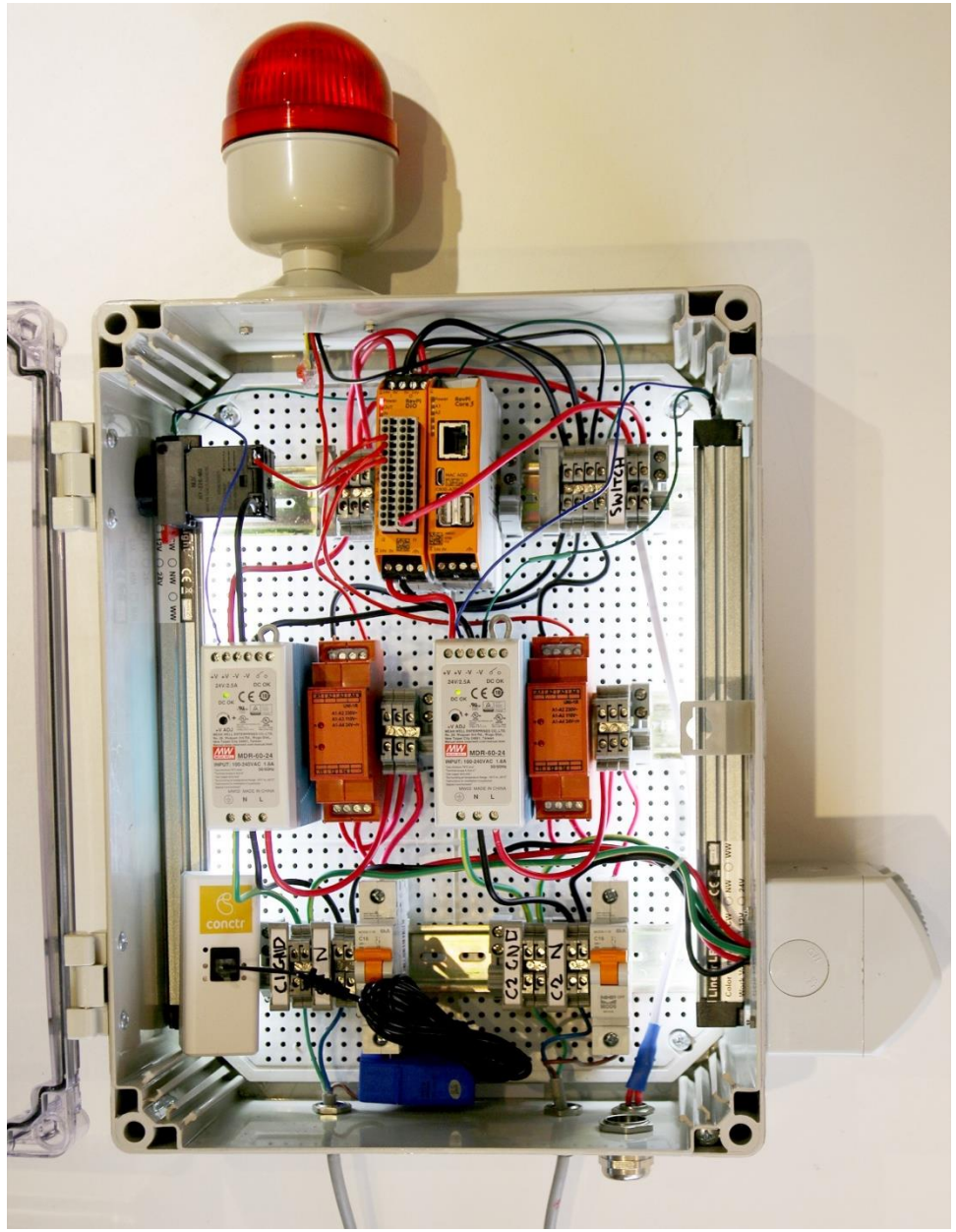
Applications & services

Transform, shift culture

Change management



AWS Greengrass Demo: Connected Factory



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