AWS re:Invent

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IOT401-R2

Instrumenting Industry 4.0 with AWS IoT services

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Agenda

Amazon Web Services (AWS) for Industrial

AWS IoT SiteWise and Amazon Lookout for Equipment

Create a gateway and ingest data

Set up Amazon Lookout for Equipment

AWS IoT SiteWise Monitor portal setup

Detect anomalies and display on the monitor portal

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Industry challenges in asset optimization



Limited visibility into production performance

Daily reports are historical, manual, and inaccurate

Managed metrics reduce employee buy-in



“Firefighting” vs. strategic improvement

Higher cost of reacting to unexpected failures and downtime

Front-line knowledge is not as involved in operational strategy



Extended time for corrective action

Visual and data-driven plant is currently labor-intensive

New analytic tools take too long to implement with low ROI

aws

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Benefits of monitoring industrial assets with machine learning (ML)

- Shift from reactive, descriptive analytics to proactive forecasting of poor performance

  Wind turbine 17 was exhibiting behavior similar to past weeks before power output was down by 10% or more

- Model is inclusive of intrinsic or extrinsic forces

  Can learn the difference between maintenance activity and seasonal/procedural changes

- Single- and multi-variate root causes
  - Too difficult for a human analyst to detect on a dashboard
  - ML-powered indicators of anomalous features

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AWS IoT SiteWise



Ingest data from industrial equipment, data servers, and historian databases





AWS IoT SiteWise

Collect, organize, and analyze industrial data at scale



Collect

Read data from onsite equipment using industrial protocols such as OPC-UA, Modbus and EtherNet/IP



Model

Create virtual representations of physical assets, process equipment data streams, and compute industrial performance metrics



Monitor

Create fully managed web applications to visualize real time and historical equipment data, with no coding

AWS IoT SiteWise Edge

Software that runs on-premises on an industrial gateway to collect, process, and monitor equipment data locally – even when not connected to the Internet



Predictive quality



Asset condition monitoring



Predictive maintenance

Consume asset data to create local or cloud applications that optimize factory output quality, maximize asset utilization and identify equipment maintenance issues

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Introduction to Lookout for Equipment

Why Lookout for Equipment?

✓ Reduce touchpoints, resources, costs, and time

✓ Continuously improving

✓ Scalable



Historical data

Time series tag/sensor data



Maintenance records

Times of historical failure and/or maintenance



Amazon S3

Store your time series data and maintenance records



Amazon Lookout for Equipment

Automatically detect abnormal machine behavior

- Ingest historical data
- Select features
- Automatically train ML model
- Evaluate performance and anomaly explanation

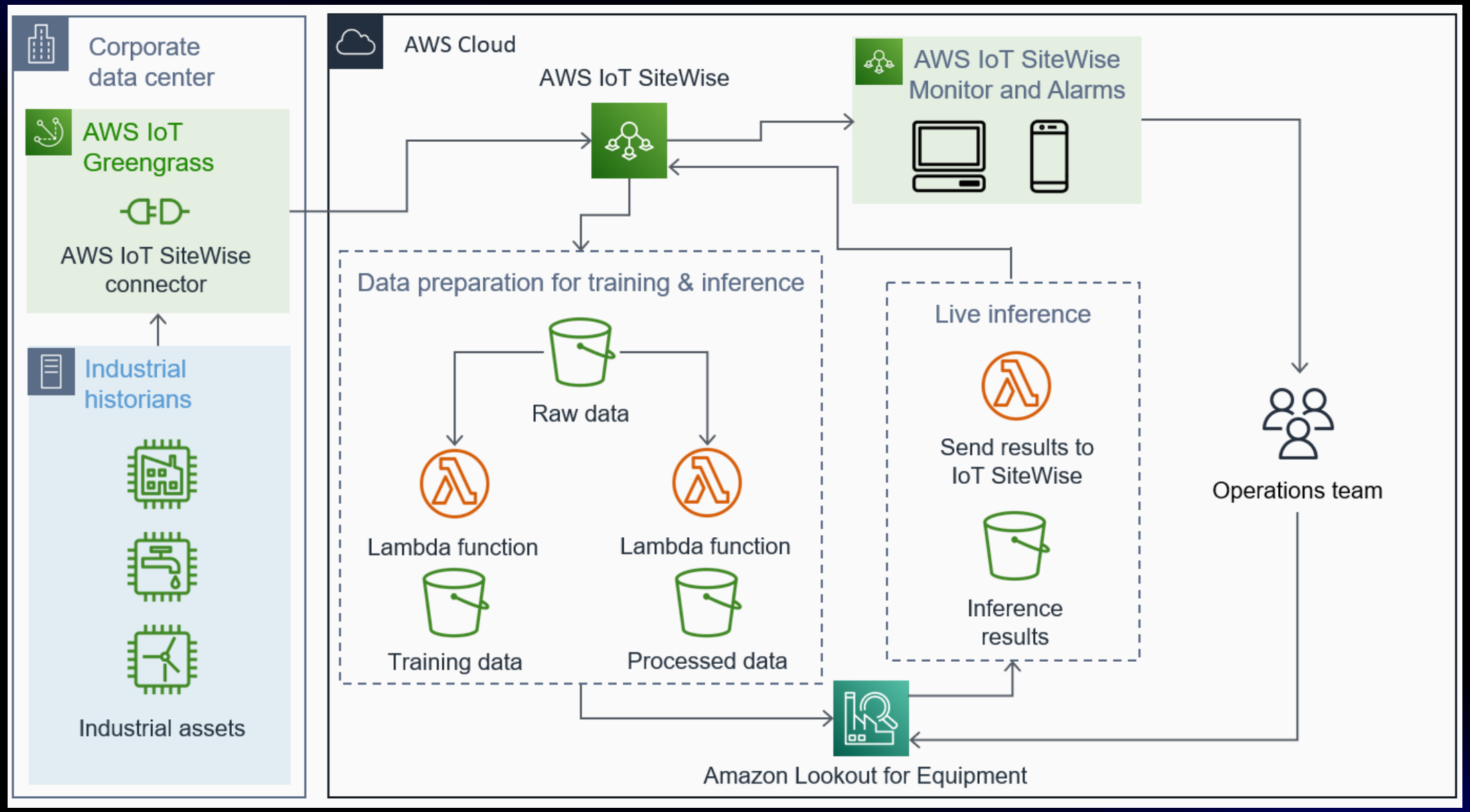


Customized scheduled inference API

Continuous scheduled inferencing on operational data for near real-time insights

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Architecture



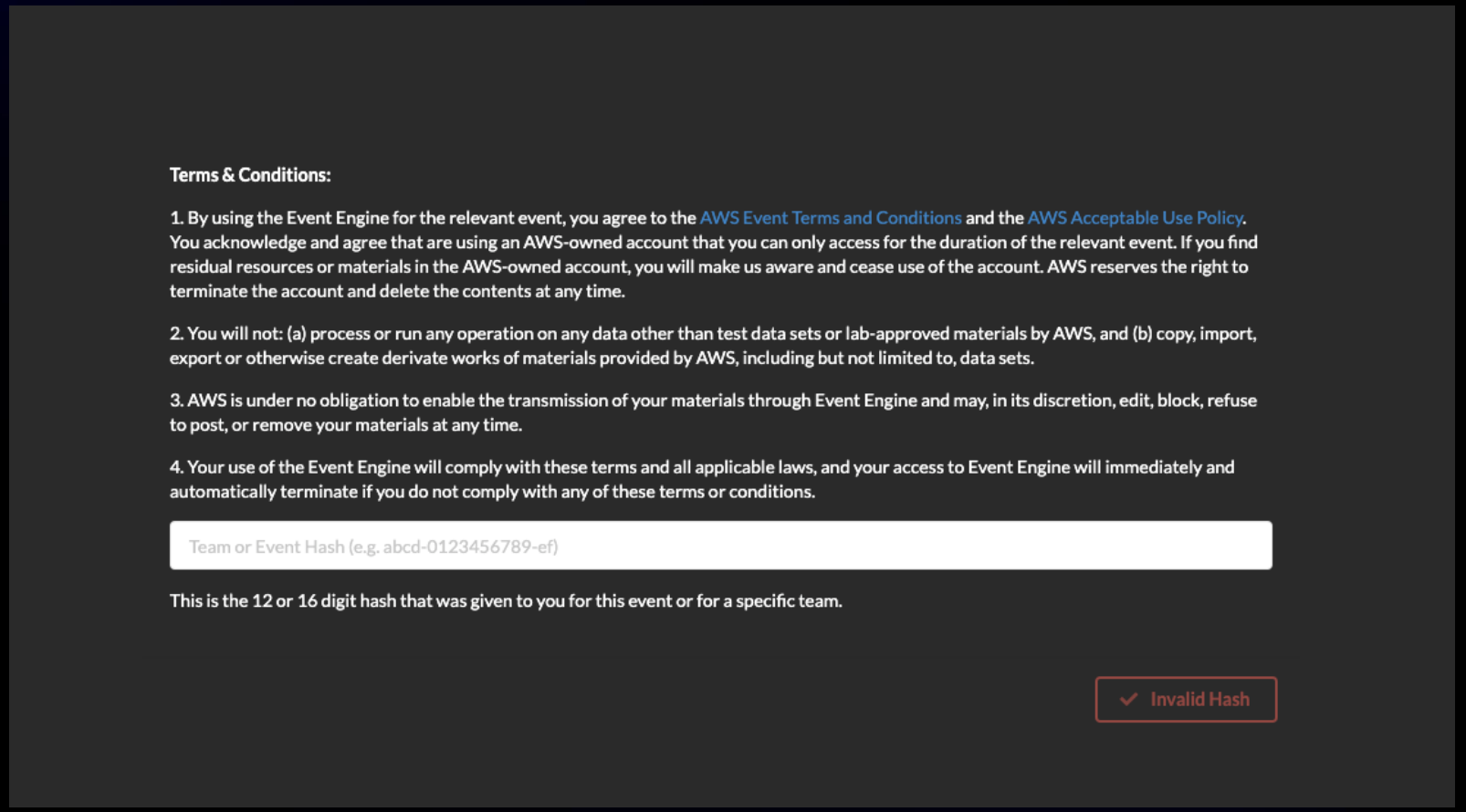
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What you are going to build

- You monitor industrial assets (CNC machine)
- Collect machine data with an OPC-UA server
- Ingest data through a gateway and monitor data
- Create a Lookout for Equipment model
- Run inference from the data against the model
- Ingest inference results into your monitor portal

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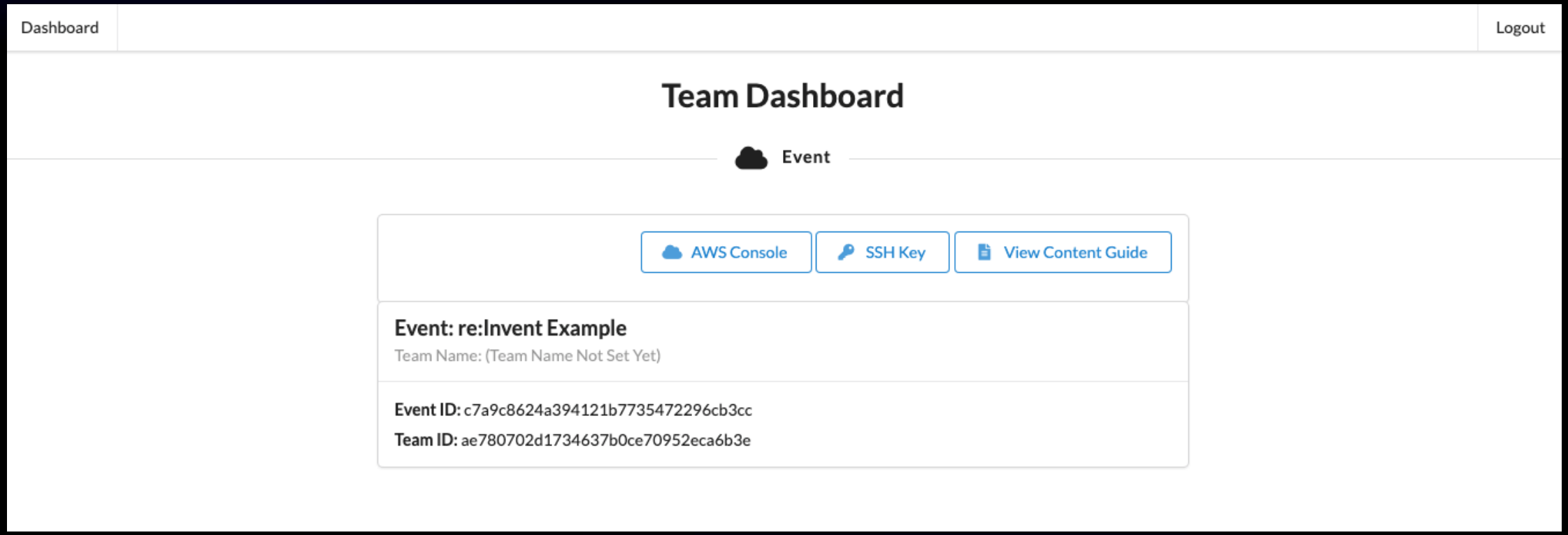
Customer Dashboard login



https://dashboard.eventengine.run

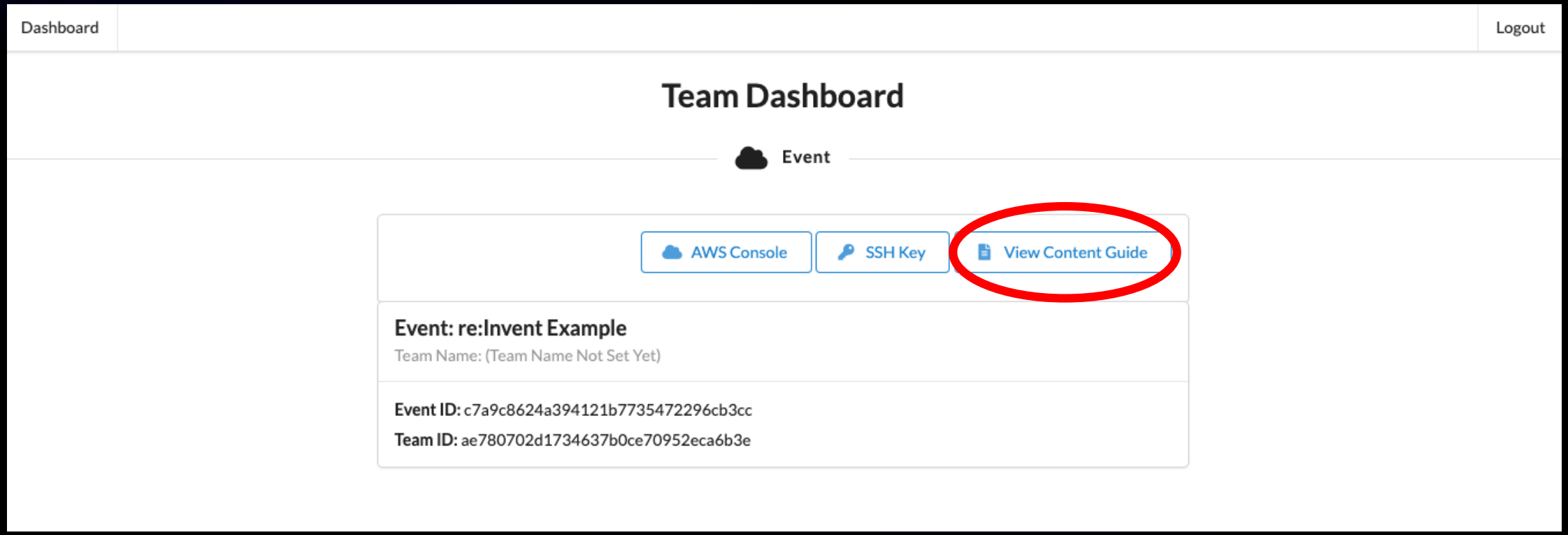
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Customer Dashboard



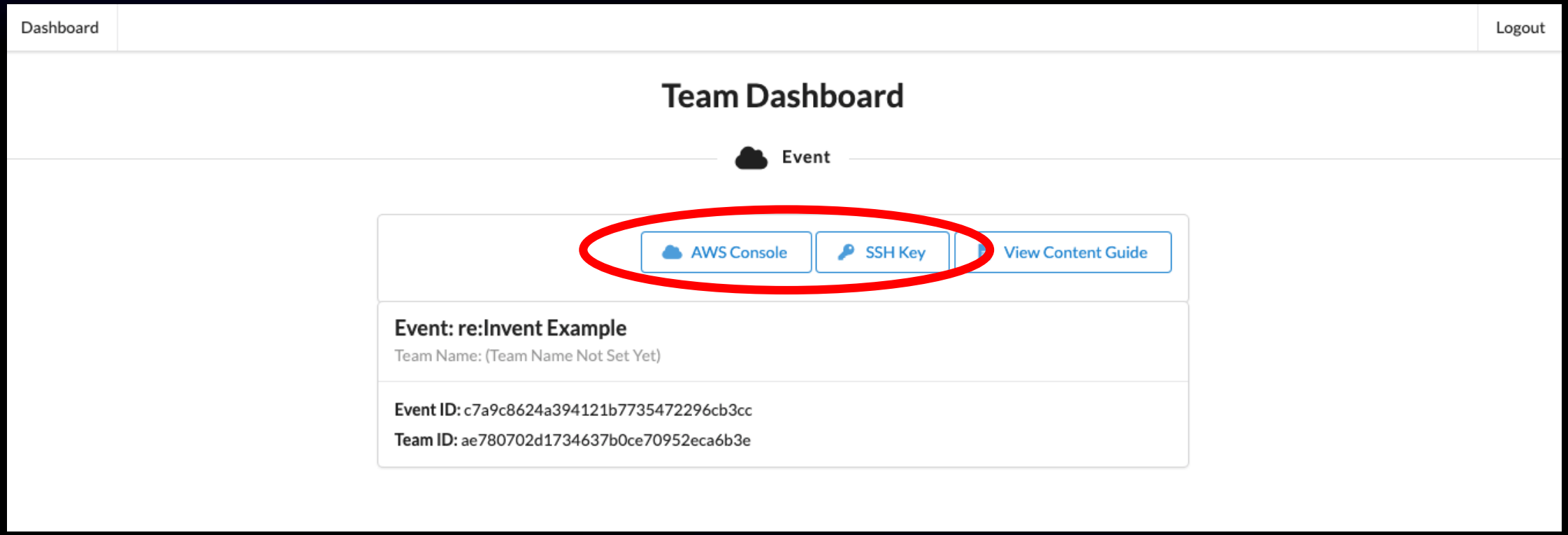
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Key takeaways

- Managed services let you focus on the business problem
  - Simpler architecture, less overhead, and lower time-to-value
- AWS IoT SiteWise and Lookout for Equipment are OT enablers
  - Reduce dependency on IT and data science functions
- Use IoT and artificial intelligence (AI) to proactively meet asset optimization goals
  - Forecast when and why assets will be underperforming

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Thank you!

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