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EBOOK

Accelerating Industrial DataOps to Optimize Data Management and IoT Scalability

A Catalog of Case Studies

Table of Contents

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Industrial DataOps promises to transform operations for industrial concerns

IIOT PRACTICES ARE HAVING AN IMPACT

Integrating data from business systems, control systems, historians, maintenance management, and business systems are dramatically increasing situational awareness

DataOps techniques are improving data management for analytics delivery to increase its operationalization, better support workforce, and overcome supply chain issues

Real time IIoT is enriching analytics applications

Increased visibility, predictability, and prescriptive powers are taking the guesswork out of decision-making

BUT DEVELOPERS STRUGGLE TO SCALE SUCCESSFUL AI/ML PROJECTS.

WHY? Data management is many times the culprit.

Industrial OT and Business IT are not the same. For example:

Business data is delivered in batches or transaction records complete with metadata descriptors but lacking synchronous time stamps for correlation.

Industrial OT data is high-velocity time-series and event information that lacks the detailed descriptors and features needed to use it outside of operations.

That means the usual IT or OT data management techniques are insufficient for IIoT requirements.

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Hitachi Vantara Lumada Industrial DataOps makes correlating OT and IT data easier.

HITACHI VANTARA INDUSTRIAL DATAOPS:

- Automates the process of abstracting, tagging, and rationalizing IT and OT data
- Organizes OT data in your data lake, data hub or data warehouse, making it is usable for analysis and building AI/ML solutions.
- Establishes data pipelines
- Orchestrates transformations and inferences seamlessly within a workflow.
- Enables engineers to work with data scientists, analysts, and applications consultants to unlock value and enhance operations
- Speeds up the creation and training of AI/ML models and digital twins

Lumada Industrial DataOps Drives Faster Insights and Accelerates Outcomes

Productivity with Automation
Fully automate scaling your data pipelines for increased business agility and lower cost using modern cloud data management.

Faster Production Deployment
Activate frequent production deployments through continuous integration and continuous delivery across a governed multicloud data fabric.

Pipeline and Data Quality
Empower your business with self-service access, low-code blending and publishing with automated data governance.

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Hitachi Vantara Lumada Industrial DataOps for IIoT

Weave an edge-to-cloud intelligent industrial data fabric that delivers trusted data for predictive and prescriptive insights and outcomes to drive decision-making.

Industrial DataOps
Provides the high-level data management to access, integrate, transform, and analyze data in motion and at rest from the widest array of sources while meeting compliance and governance requirements.

Digital Twins
Better represent industrial assets to support the creation of an efficient production pipeline that provides data scientists/analysts with the rich data signal that they need to organize data and create AI models to detect events.

Machine Learning Services Framework
Accelerate the training of AI models by providing data science personnel with flexible templates that they can fine-tune to meet business objectives quickly.

IIoT Analytics
Ready-made application components that help engineers and developers shorten the time needed to deliver analytics.

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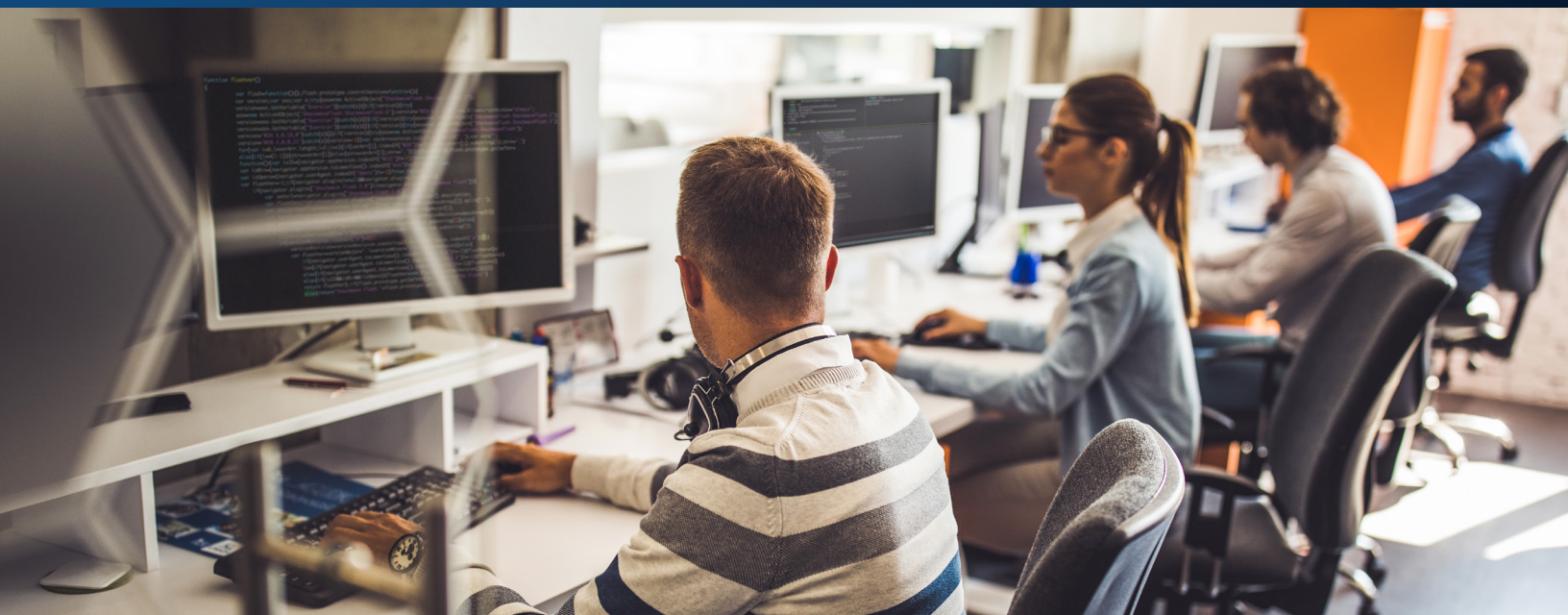
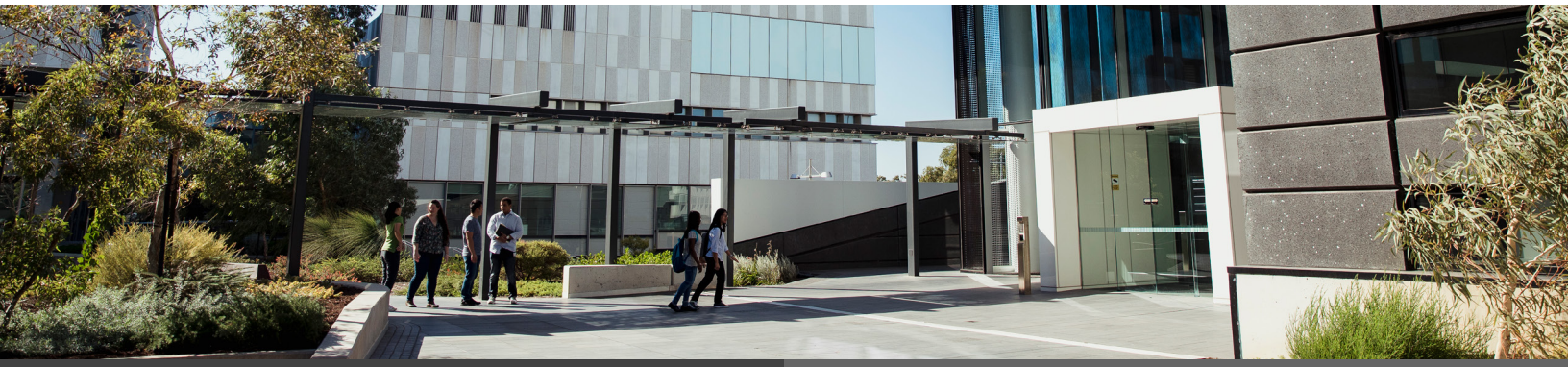
Lumada Industrial DataOps in Action

Read on to see how data management, AI applications, and next-level decision-making come together to power modern industrial enterprises.



Smart Building and Security for Covid-19



GOAL
Monitor people access into buildings public spaces

ORGANIZATION
Large multi utility company

ASK/CHALLENGE

Challenge:
Monitor space utilization and sanitization, keep number of people allowed under thresholds imposed by law

Impact:

- Rising risk of infection
- Crowded public spaces
- Closure of the structure for sanitation sometimes even for days

Data available:
People count, space occupancy, sanitation team shifts

SOLUTION

- Secure data onboarding using industrial gateway with store & forward for preventing data loss and encryption of data
- Near real time monitoring dashboards with alarms based on timers and people occupancy
- Alarms sent to operational team to minimize sanitation time

BENEFITS

- Develop a “single pane” dashboard to monitor space utilization KPIs
- Connecting and managing different systems using custom drivers allows usage of commodity hardware

KEY ACHIEVEMENTS

- Fewer closure days (30% less)
- Reduction of crowded situations and related Covid cases
- Rich data correlation database available for further improvements on public spaces utilization

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Power Grid Cabinets

GOAL
Monitor sensors inside a secondary station cabin

ORGANIZATION
Large multi utility company

ASK/CHALLENGE

Challenge:
Monitor key transformer parameters together with overall cabin status

Impact:

- Hard to monitor critical parameters in real-time
- Different sensors with different protocols
- No intrusion detection

Data available:
Data from transformer sensors, cabin environment and video stream from video camera

SOLUTION

- Secure data onboarding using industrial gateway with store & forward for preventing data loss and encryption of data
- Use machine learning to leverage historical data and from real time data to provide forecasting on electric current and voltage behavior.
- Edge video computing for intrusion detection to avoid bogging down network

BENEFITS

- Develop a “single pane” dashboard to monitor cabin status and people accessing the structure
- Data integrity for frequently disconnecting remote sites thanks to store & forward, better understanding of transformer parameters

KEY ACHIEVEMENTS

- Avoided buying new SCADA license, reduced SCADA workload
- Forecast of vital cabin parameters for operational cost optimization and for avoiding downtime
- Saving of bandwidth costs, better utilization of communication channel

Smart Poles

GOAL
Provide advanced functionalities to lighting poles

ORGANIZATION
Large multi utility company

ASK/CHALLENGE

Challenge:
Integrate with existing radio network with large territory to cover, ingesting structured and unstructured data.

Impact:

- Data normalization and ingestion
- Monitoring of devices on lighting poles

Data available:
Real-time data from sensors both structured and unstructured

SOLUTION

- Secure data onboarding using industrial gateway with store & forward for preventing data loss and encryption of data
- Provide insights on data onboarded using advanced analytics and video analytics
- Central storage for all the data to easy monitor, analyze and correlate data

BENEFITS

- Control room for monitoring near real time data and status of the lighting poles
- Data access provided to police
- Comply with regulatory requirements for monitoring public spaces

KEY ACHIEVEMENTS

- Easy monitoring of infrastructure
- Central monitoring dashboard
- Implement various case studies including video

Energy Performance Monitoring in Industrial Plants

GOAL
Monitor energy performance of industrial plants

ORGANIZATION
Large utility company

ASK/CHALLENGE

Challenge:
Provide reporting and insights on energy consumption inside waste treatment composting plants

Impact:

- Analysis on data coming from energy sensors
- Understand patterns in energy utilization

Data available:
Historical data from SCADA system, real-time data from sensors

SOLUTION

- Secure data onboarding using industrial gateways with store & forward for preventing data loss and encryption of data.
- Provide dashboards and reports with energy-related KPI's to enable energy management of plants.
- Advanced analytics to understand energy consumption behavior and identify patterns for optimization.

BENEFITS

- KPI and analytical dashboards with Self-Service BI capabilities to easy understand energy consumption
- Fast and secure data onboard from the field avoiding to overload critical production systems
- Deliver insights with advanced analytics capabilities identifying energy consumption patterns

KEY ACHIEVEMENTS

- Easy KPI visualization with reports
- Central monitoring dashboard
- Provide insights to optimize energy consumption

Smart Metering

GOAL
Improve smart metering procedures

ORGANIZATION
Large multi utility company

ASK/CHALLENGE

Challenge:
Smart Meters of various types, some manual walk-by data collection, others using NB-IoT CoAP. Need to have future proof architecture.

Impact:

- No Real Time data, inaccurate sampling
- Hard to correlate with IT systems, inaccurate billing
- No advanced analytics, no integration with other company data

Data available:
Smart Meter data, historical sampling, billing

SOLUTION

- Data onboarded from different sources collected and normalized using Data Services
- Meter data collected enriched with IT system data and analyzed to find correlations. Data exposed to other branches
- Data visualization with easy data interoperation using SQL standard

BENEFITS

- Develop a “single pane” dashboard to monitor meter parameters and KPIs of water flow
- Dramatic reduction of data collection time from hours / days to seconds, making real time data analysis available

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Smart Organic Waste

GOAL
Management of Smart Compost machines

ORGANIZATION
Large multi utility company

ASK/CHALLENGE

Challenge:
Manage multiple composting machine distributed over the territory

Impact:

- Asset and waste Management
- Reduction of cost for waste

Data available:
Real-time data from sensors

SOLUTION

- Secure data onboarding using industrial gateway with store & forward for preventing data loss and encryption of data.
- Management of Smart Compost machines using Lumada framework
- Near real time and historical data analytics and visualization.

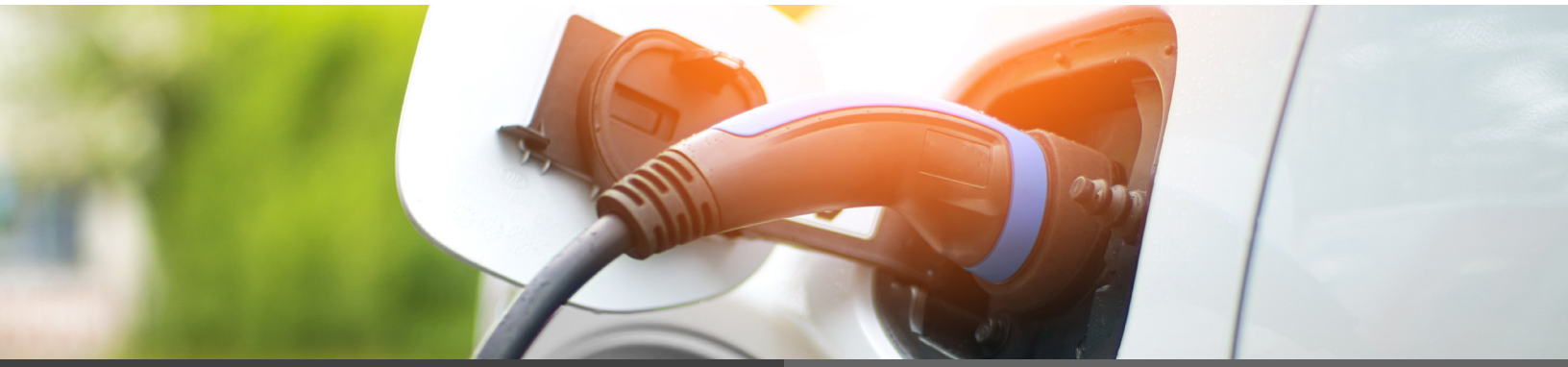
BENEFITS

- Modern and healthy waste management with distributed composting
- Environment and economical benefits
- Centralized architecture based on microservices managing the entire data pipeline plus compost machine operations

KEY ACHIEVEMENTS

- Compost created where waste is produced
- Pollution reduction
- Waste management expense reduction

EV Charging Solution



GOAL
Remote asset monitoring of EV charging stations

ORGANIZATION
Large energy company

ASK/CHALLENGE

Challenge:
EV chargers (assets) distributed throughout a wide geographical area, making it hard to monitor them.

Impact:
Problematic assets remain non-operational for prolonged periods of time

Data available:
Sensor data from EV charge controller – start-stop charge, power, charging measurements, etc.

SOLUTION

- Collect data in real-time data from EV chargers via Hitachi Energy's controller using edge gateways
- Cloud solution for data retention (storing and categorizing the data received from the edge devices)

BENEFITS

- Optimize operational efficiency by reducing time that EV chargers are non-operational
- 360 view of a fleet of assets, with near-real-time detection of problematic assets.

KEY ACHIEVEMENTS

- Increase customer satisfaction
- Optimize energy use
- Reduce downtime of EV charging stations
- Decrease maintenance costs

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Remote Condition Monitoring

GOAL
Remote asset management

ORGANIZATION
Major passenger rail operator in Europe

ASK/CHALLENGE

Challenge:

- Data is scattered in 40+ different OT data silos
- Combination of different data sources (ex. Sensors, SCADA, 3rd party applications)

Data available:
Real-time sensors, historical SCADA data, and data from 3rd party applications

SOLUTION

- Near real-time data ingestion and monitoring
- Alerts and notifications that are tailored to streamed data from IoT devices

BENEFITS

- Inform decision making in the control centers with near real-time data ingestion
- Monitoring health and performance of assets

KEY ACHIEVEMENTS

- Train performance improvement
- Real-time response to alarms from control center

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Molding Line Operations

GOAL
Capacity and throughout improvements for molding process

ORGANIZATION
Manufacturer and supplier of products for mining

ASK/CHALLENGE

Challenge:

- Combination of offline assembly and PLC controlled assets
- Data scattered with combination of manual forms and spreadsheet – forms differs between each assembly process

Data available:
Real-time data from several PLCs

SOLUTION

- Real-time data ingestion from multiple existing PLCs
- Store in time-series format for applications such as Digital Work Order, Digital Work Instructions, and dashboard visualization – collaboration with Lumada Manufacturing Insights
- Secure data onboarding using on-premise server with store & forward for preventing data loss and encryption of data.

BENEFITS

- Digitize data capturing in the molding line – reduce manual workloads
- Identify capacity & throughput improvement areas
- Near real-time dashboards for KPI analysis

KEY ACHIEVEMENTS

- Reduce manual workloads and operation cost
- Optimize production efficiency
- Reduce human error by digitizing the workloads

Predictive Maintenance for Smart Space

GOAL
Predictive maintenance for amusement rides

ORGANIZATION
Disney Theme Parks

ASK/CHALLENGE

Challenge:
Need to reduce physical maintenance over 10 rides with 30+ sensors distributed in different locations

Impact:

- Data normalization and ingestion
- Monitoring of rides

Data available:
Real-time data from sensors

SOLUTION

- Real-time data ingestion from customer's gateway
- Process high-volume data
- Secure data onboarding using on-premise server with store & forward for preventing data loss and encryption of data

BENEFITS

- Lean Footprint (written in GoLang)
- Cluster Architecture (deployed via Kubernetes)
- Highly Extensible (Legacy vs NextGen Sensors / Mechanical Splash Mountain vs Digital Rise of the Resistance)
- Foundation PreBuilt for both Existing and Future

Anomaly Detection for Amusement Rides

GOAL
Prevent unplanned ride downtime during park operations

ORGANIZATION
Disney Theme Parks

ASK/CHALLENGE

Challenge:
Prevent rides from undergoing unplanned downtime during park operations

Impact:

- Guest experience adversely affected
- Ride evacuation is seen as a big deal

Data available:
Synthetic data from sensors

SOLUTION

- Near real time data ingestion from Mickey and Minnie Runaway Railway
- Process 12 months of data to train anomaly detection ML model
- Process ride data in near real time, interfacing with external simulation software

KEY ACHIEVEMENTS/BENEFITS

- Ability to predict when anomalies will occur, with 48 hour lead time
- High accuracy in anomaly prediction, when compared to actual anomaly detection
- Integration between Lumada software and external simulation software

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