De-Risk Your Digital Transformation — And Reduce Time, Cost & Complexity
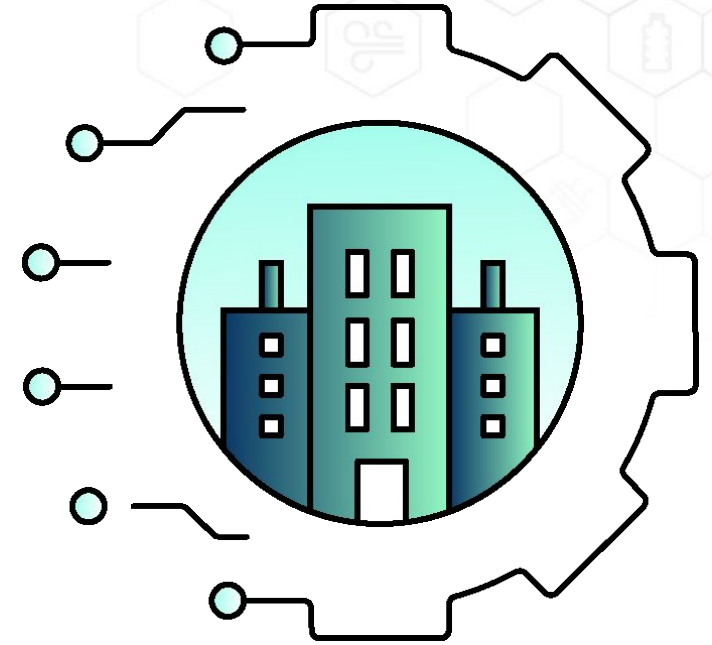
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Presenter

Travis Cox

Chief Technology Evangelist

Inductive Automation

Agenda

- Introduction to Today's Speakers and Ignition

- The Power of Data

- Digital Transformation & Azure Digital Twin

- Easy to Get Started

- Live Demo

- Use Cases – The Art of the Possible

- Helpful Resources

- Conclusion

- Audience Q&A

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Presenter

Arlen Nipper

President and CTO

Cirrus Link Solutions

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Presenter

Mike Peterson

Manufacturing Industry

Executive

Microsoft

Presenter

Matt Townsend

Intelligent Manufacturing Solutions
Expert

Ignition
by inductive automation

The Unlimited Platform for SCADA and So Much More

- Connect, Design, Deploy Without Limits:
  - One central hub for everything on the plant floor
  - Create any kind of industrial application
  - Web-deploy clients to desktops, industrial displays & mobile devices

- Unlimited licensing
- Industrial-strength security and stability
- Trusted by thousands of companies worldwide

Power of Data

**How can we …**

- … access more of our data?
- … make the most of our data?
- … provide a single source of truth for production data, provide context, and make the data accessible to the entire business?
- … bridge the divide between OT & IT
- … minimize or eliminate manual data entry & coding
- *And can we do it without spending 6 months and blowing through our budget?*

Power of Data

- To fully unlock the power of data for digital transformation, two things we need to do are **model** and **add context** to data.
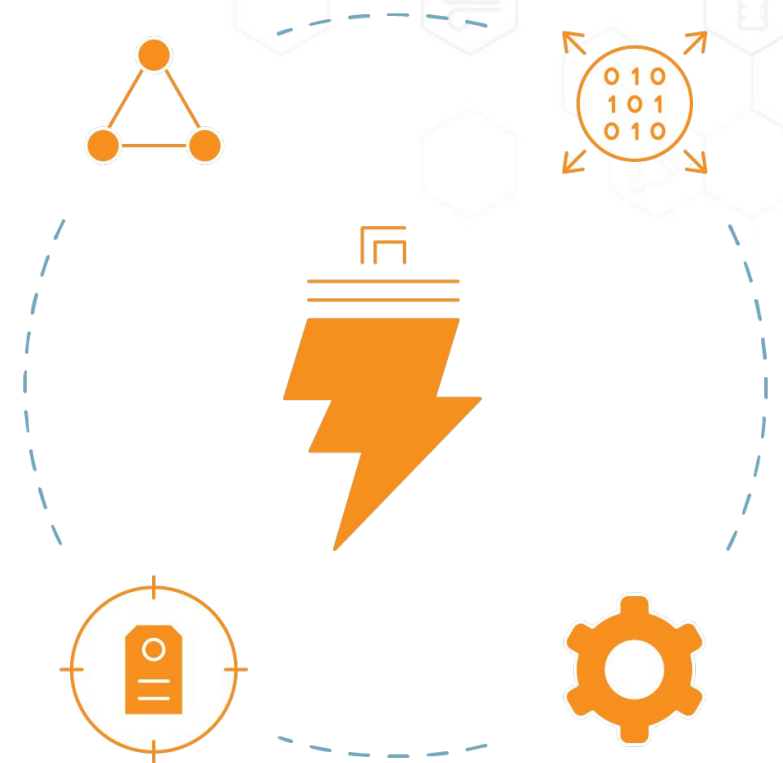
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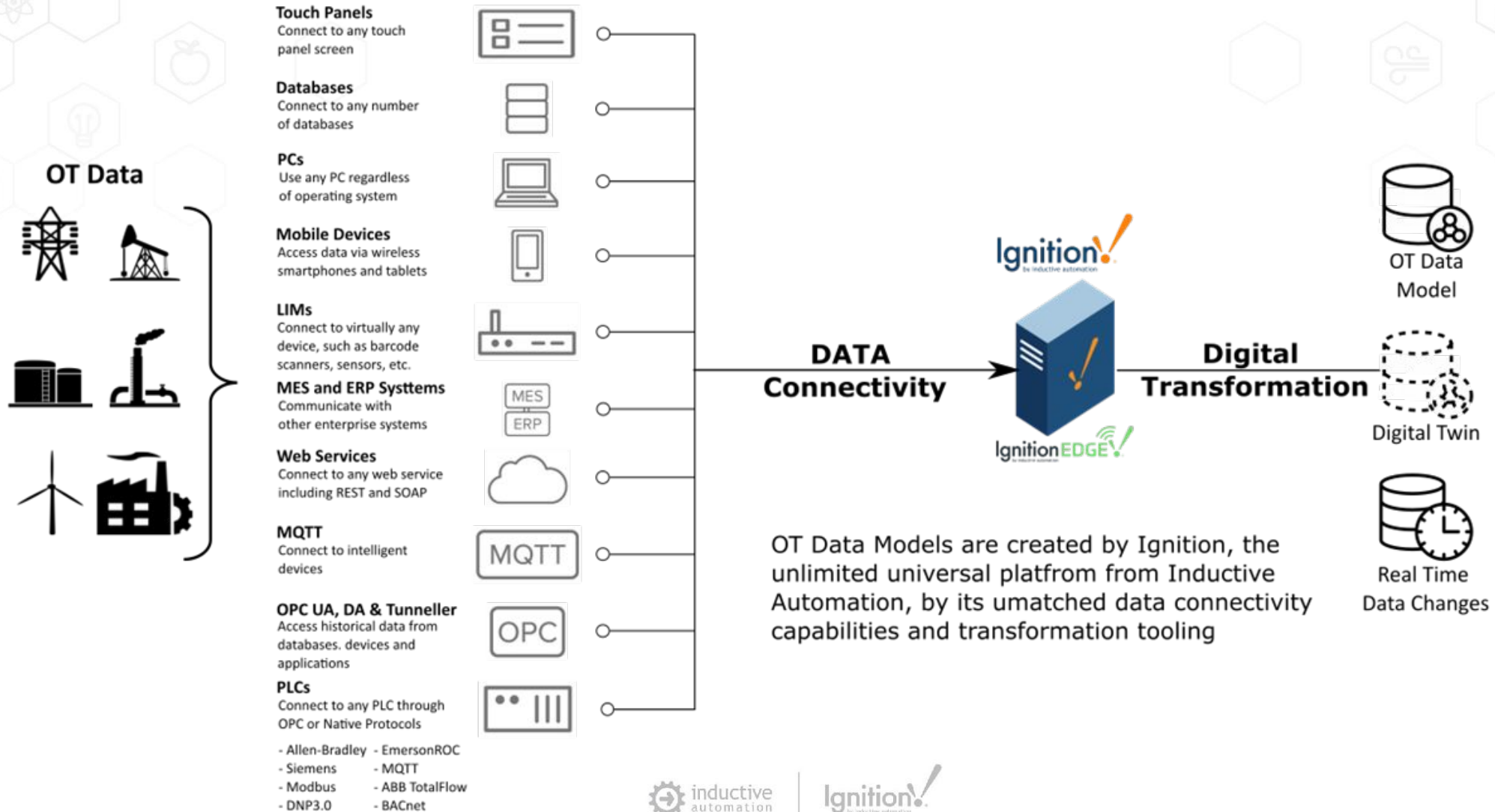01010
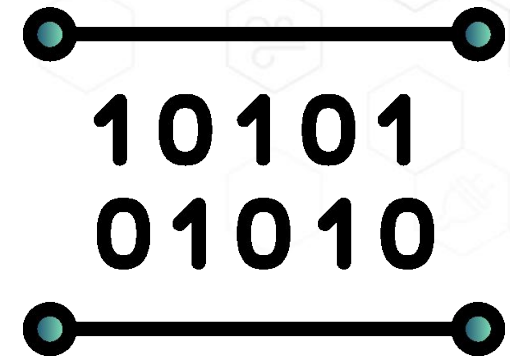
Power of Data

Data Modeling
- Structuring data in a unified way to make it easy to understand
- Important to IT
- Not properly supported by most devices and edge systems

Data Context
- Information without context is just numbers
- OT data has no contextual information but IT needs contextual information. This is one of the problems with bridging the OT/IT gap.
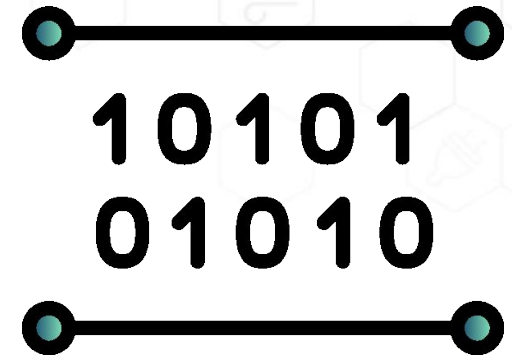
OT Data

Touch Panels
Connect to any touch panel screen

Databases
Connect to any number of databases

PCs
Use any PC regardless of operating system

Mobile Devices
Access data via wireless smartphones and tablets

LIMs
Connect to virtually any device, such as barcode scanners, sensors, etc.

MES and ERP Systtems
Communicate with other enterprise systems

Web Services
Connect to any web service including REST and SOAP

MQTT
Connect to intelligent devices

OPC UA, DA & Tunneller
Access historical data from databases. devices and applications

PLCs
Connect to any PLC through OPC or Native Protocols

- Allen-Bradley
- Siemens
- Modbus
- DNP3.0
- EmersonROC
- MQTT
- ABB TotalFlow
- BACnet

DATA Connectivity

Digital Transformation

OT Data Model

Digital Twin

Real Time Data Changes

OT Data Models are created by Ignition, the unlimited universal platfrom from Inductive Automation, by its umatched data connectivity capabilities and transformation tooling

Power of Data

- Data standardization across the enterprise
  - Share data with anyone in the organization
  - Improve productivity
  - Bridge OT and IT
    - How? Unified Namespace

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Power of Data

Sparkplug Provides a Standard for Modeling OT Data

The Sparkplug B Specification:

- Defines an OT-Centric Topic Namespace, Data Model/Asset Structure, and Extensible Process Variable Payload
- Defines MQTT State Management
- DOES NOT break or any in way modify the MQTT specification.
- *Establishes a Single Source of Truth for Models/Assets/Tags at the Origin!*

Digital Transformation & Azure Digital Twin

IoT Bridge for Azure

OT Data Ingestion for Data Models in Azure Digital Twin (ADT) and real-time updates to Azure Data Explorer (ADX)

- Automatically Discovers Digital Twins
- Automatically Creates Digital Twin model
- Automatically Defines Digital Twin Template Parameters
- Automatically Defines Digital Twin hierarchy
- Efficiently pushes Tag Data into ADX Time Series Database
- Requires No Coding, just a little Configuration!

IoT Bridge for Azure

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Simplify and Make Digital Transformation Easy!
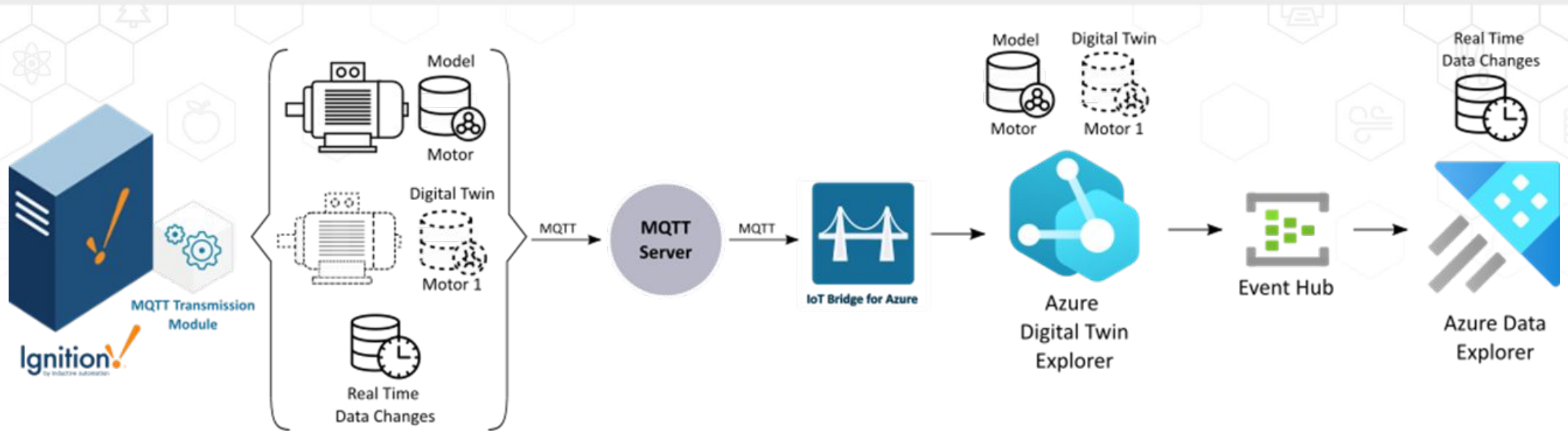
- IoT Bridge for Azure securely connects to Azure Digital Twins Explorer (ADT) through the Azure Permissions
- IoT Bridge for Azure creates the Data Model in ADT
- IoT Bridge for Azure creates the Digital Twin in ADT
- IoT Bridge for Azure updates real-time data changes to ADT
- ADT through Event Hub sends real-time data changes Azure Data Explorer and retains last known good value

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Digital Transformation & Azure

Azure Digital Twins

- Create comprehensive digital models of entire environments
- Track the past and help predict the future of any connected environment
- Break down silos within connected environments
- Build on a trusted enterprise-grade platform

Azure Data Explorer

- Fully managed big data analytics
- Optimized for real-time telemetry analysis
- Easily add the data feed to Metrics Advisor for anomaly detection & RCA
- Built in Dashboards & native integration for PowerBI, Grafana, Kibana, Databricks

Digital Transformation & Azure

- Single Source of Truth (SSOT) from OT
  - Open standards like MQTT, Cloud services like Azure, and Data Models are making it possible to get a SSoT for production data that is accessible through the entire business

- Data Models built on the edge automatically with "No Code" required.
  - Tools on platforms, not coding on operating systems

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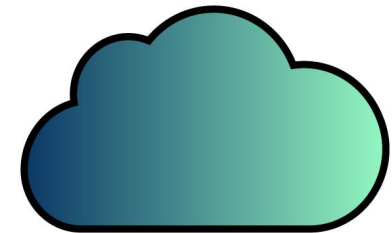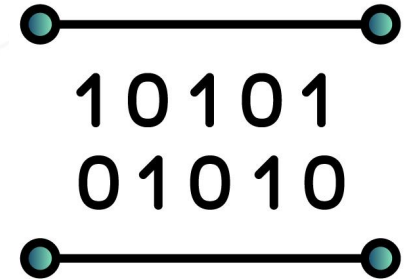
# Easy to Get Started

- Pick a factory and machines or objects to model
  - Install Ignition
  - Organize process variables into a model.
  - With just the click on a button, we can get the model showing in Azure Digital Twin.

- De-risking through ease of deployment
  - Ignition lets you connect, design, and deploy without limits.
    - Deploy anywhere
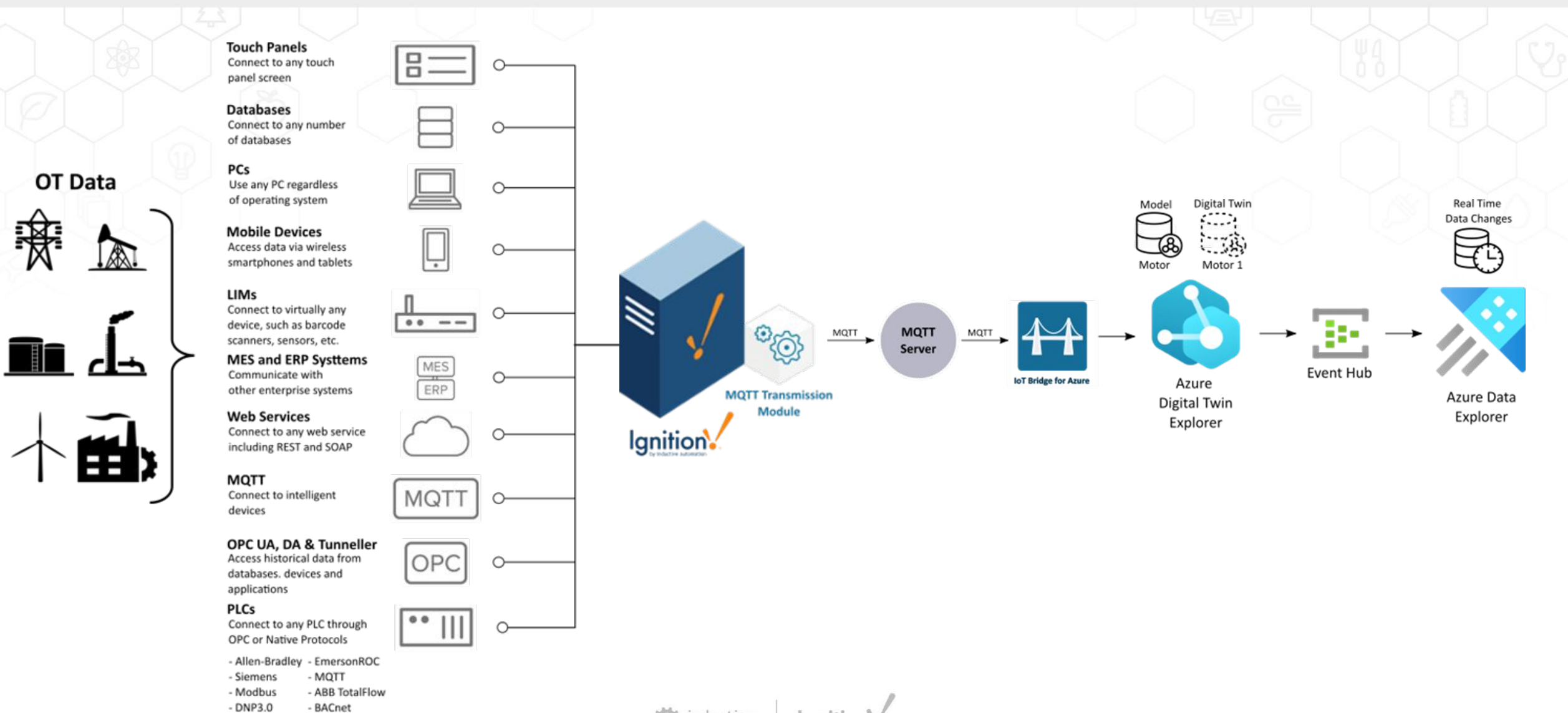   - Deploy quickly
    - Wide choice of hardware
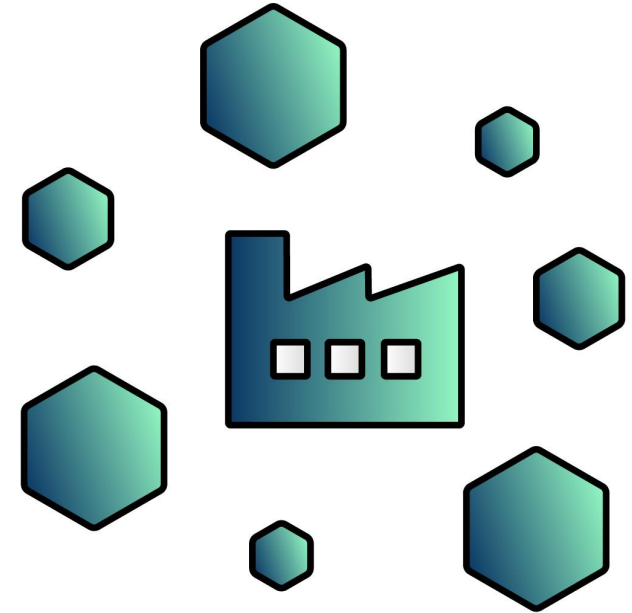
Live Demo

Steps:
- Installing Ignition
- Connecting to Allen-Bradley PLC
- Building UDT definitions and instances (models)
- Publishing through MQTT
  - To existing broker
- Show Azure Digital Twin with automatic discovery of models
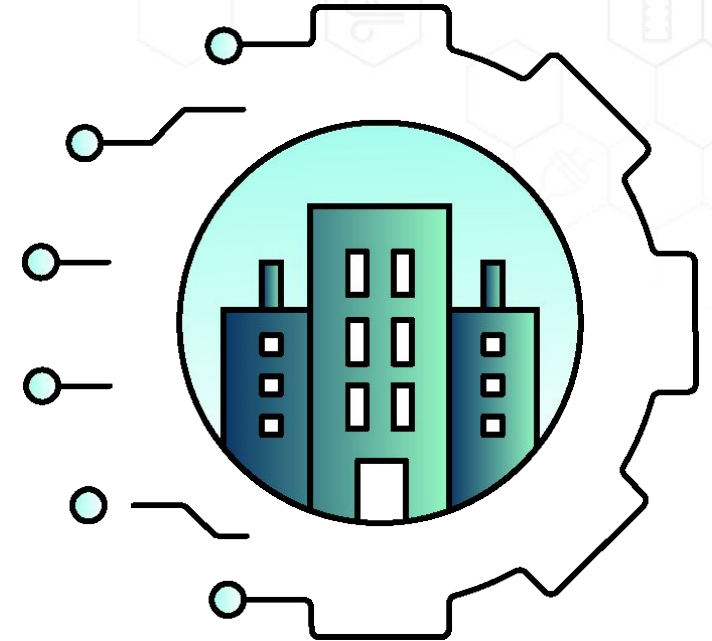- Show data flowing through
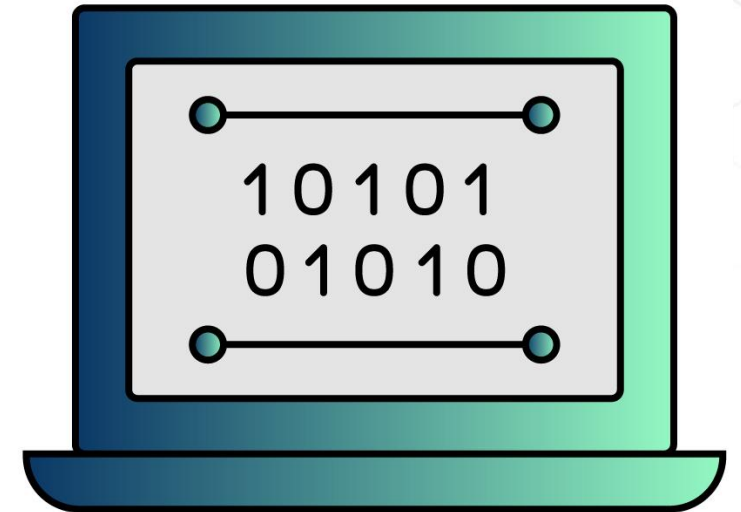
Live Demo Architecture

Demo

Use Cases — The Art of the Possible

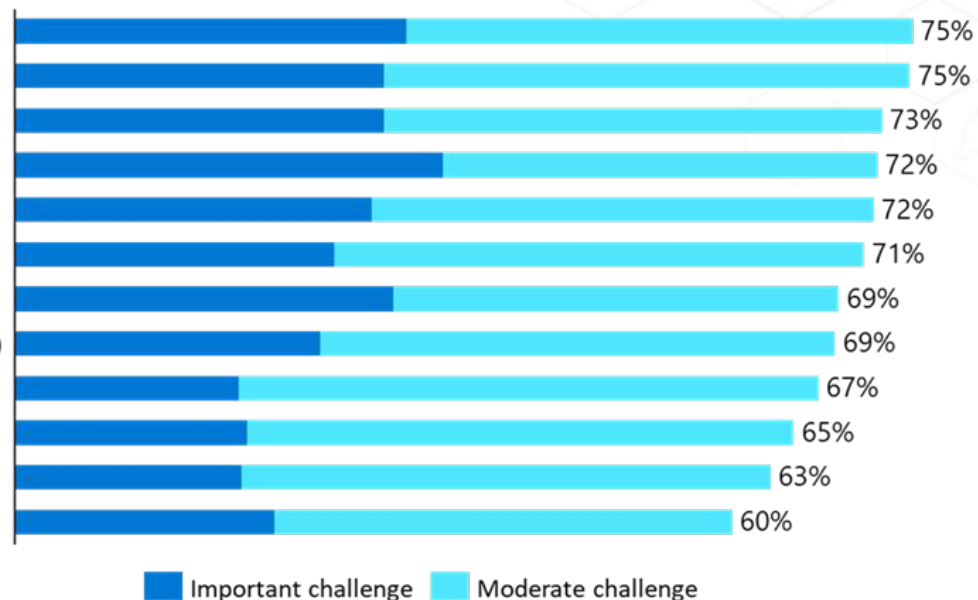- Real-world examples: Anomaly detections, operations insights, twin relationships, twin operations

Challenges in Adopting Factory Digital Twins

Factory Digital Twins

Business value created

- ✓ **Improved throughput**
- ✓ **Reduced cost**
- ✓ **Improved quality**
- ✓ **Increased reliability**
- ✓ **Improved sustainability**

Share of companies indicating challenges while adopting factory digital twins

Challenge	Percentage
Integration challenges	75%
Difficulty building digital twins fast enough	75%
Complexity of systems needed to handle digital twins	73%
Internal skill gap	72%
Cost of building the solution	72%
Proving the value/ROI of digital twins to stakeholders	71%
Lack of trained personnel	69%
Lack of tooling (e.g., developer tools, visualization tools)	69%
Challenges managing the volume of data collected	67%
Difficulty scaling simulations	65%
Difficulty managing data quality across devices	63%
Challenges modeling the environment	60%

■ Important challenge   ■ Moderate challenge

Sources: IoT Signals - Manufacturing Spotlight'2022

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Sample Architecture for Operational Visibility

Time series analytics

Azure Data Explorer Dashboards

- Near real-time dashboards
- Regression analysis, seasonality detection
- Built-in Univariate Anomaly Detection and forecasting

Azure Data Explorer

- Scalable telemetry store for data exploration

Anomaly detection, root cause analysis, triggers

Metrics Advisor
- No code UI experience with multivariate anomaly detection
- Root cause analysis
- Incident and alert management

Logic Apps
- Business action workflow engine

KPI Reporting, Plant metrics

Power BI   Grafana

Extended dashboard & reporting

Sample Architecture: Machine Learning for Failure Predictions

Azure Data Explorer

Azure Digital Twins

Machine Learning
- E2e model lifecycle management
- Pipeline deployments, monitoring & operationalization
- EDA using jupyter notebooks

Production Quality Data

Firewall

Data Lake
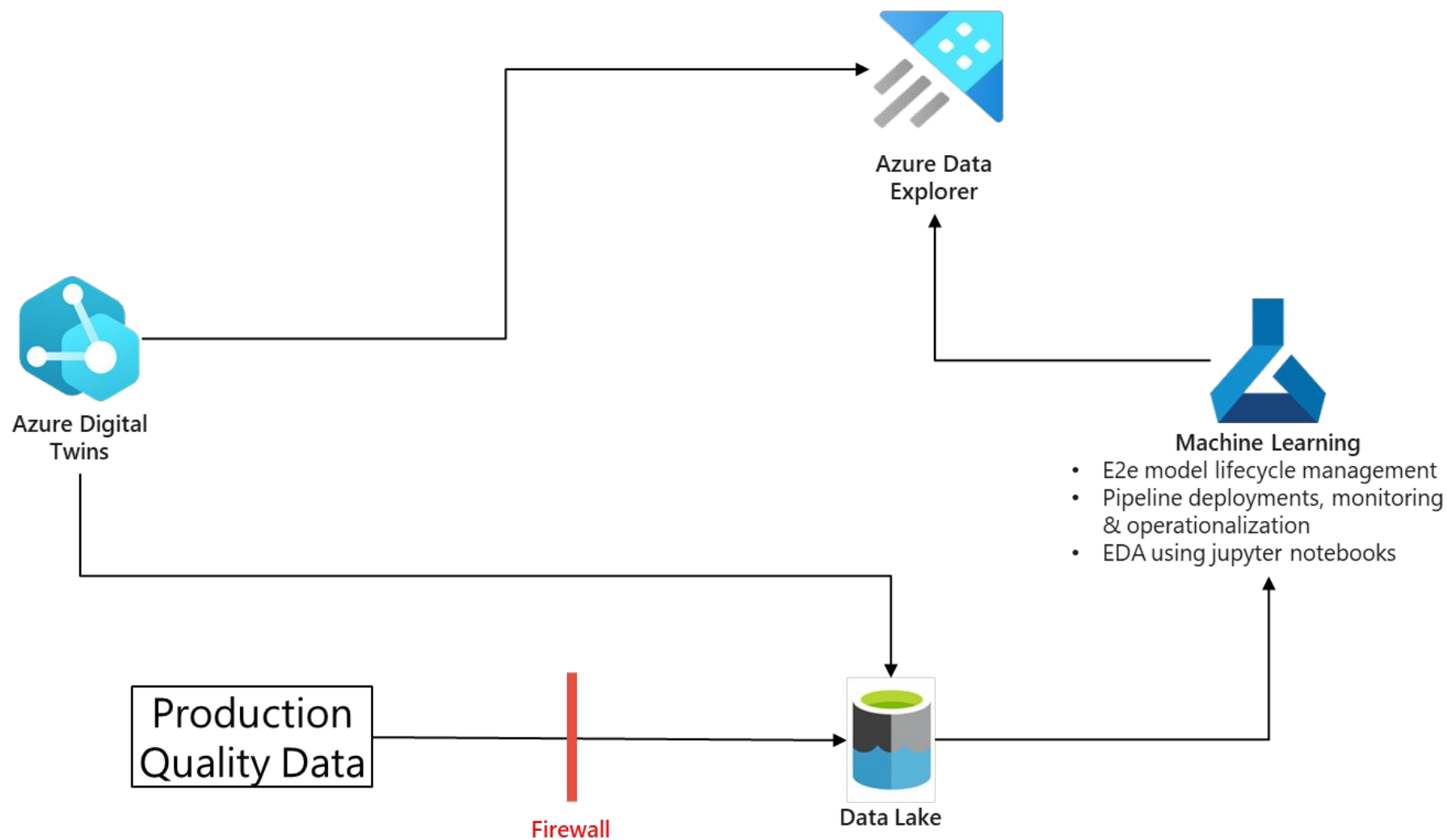
Use Case: Anomaly Detection
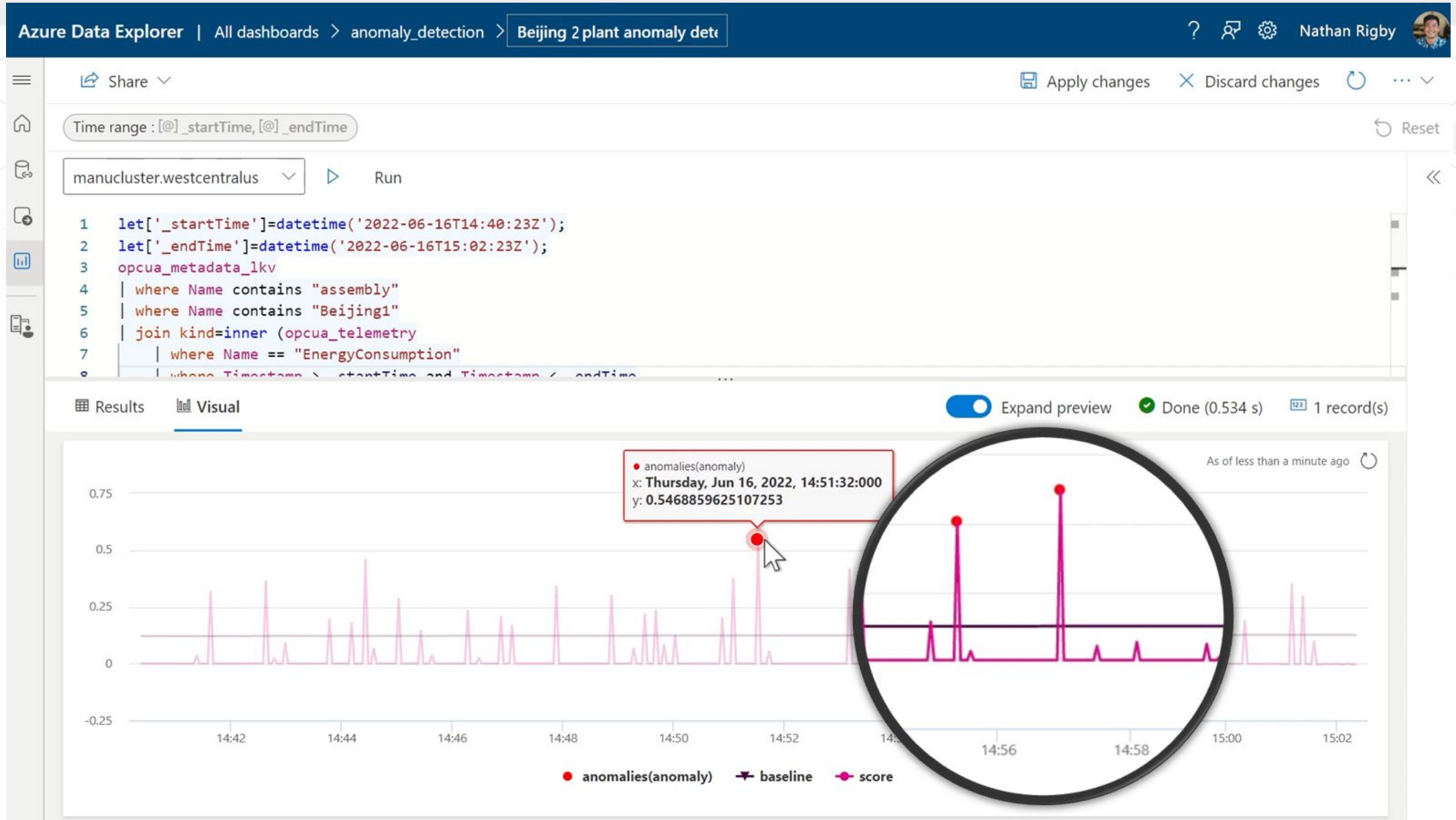
Use Case: Operations Insights
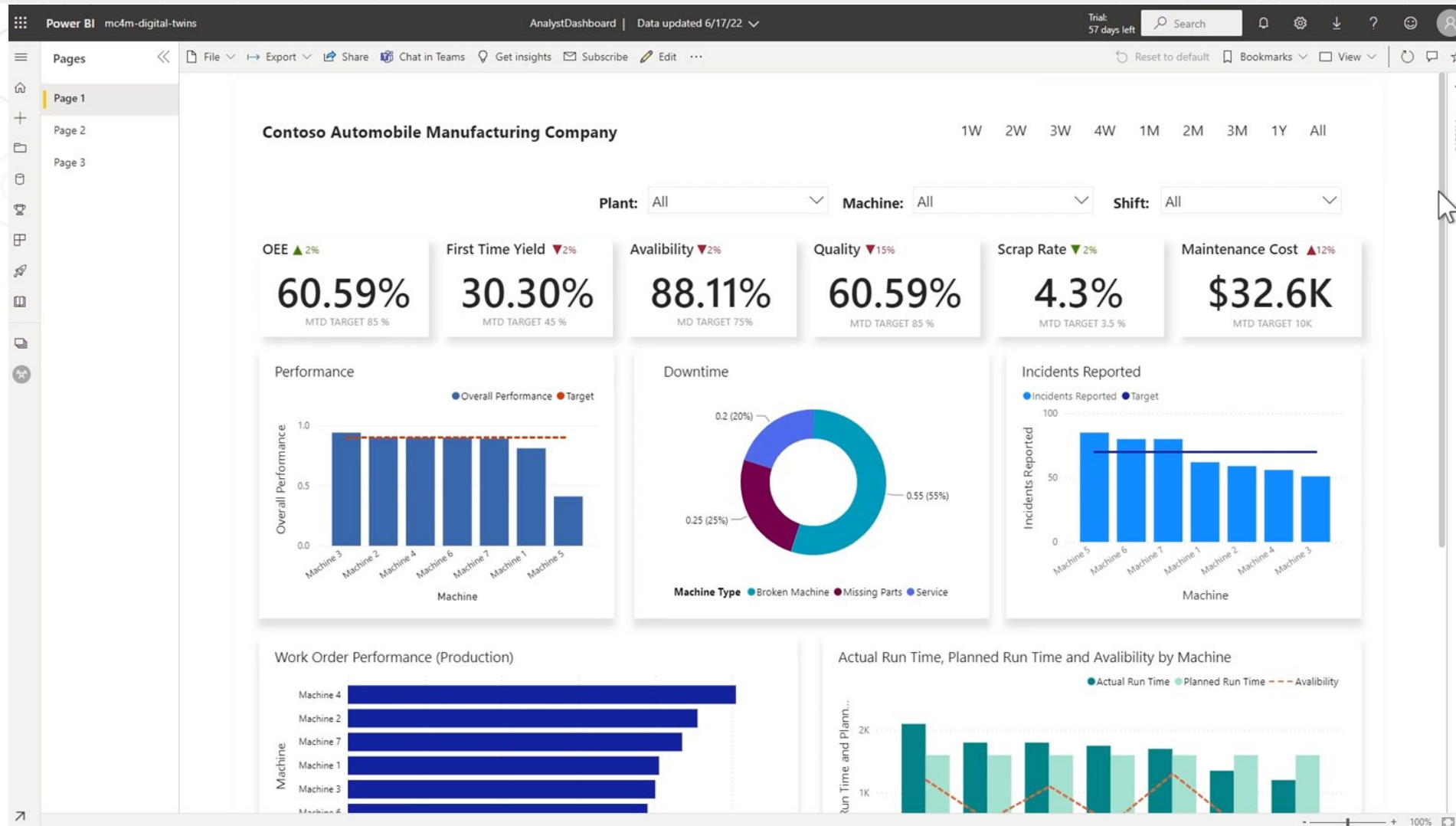
Use Case: Operations Insights in Teams

Use Case: Twin Relationships

# Use Case: Twin Operations

Helpful Resources

- Digital Transformation Workshop with Riveron
- [Azure Digital Twins Documentation](#)
- [Azure Data Explorer Documentation](#)
- [Azure Reference Architecture](#)
- [Explore Sample Twins](#)
- [GitHub - Azure Samples for IIoT Design Patterns](#)
- [Industrial Metaverse with Coca Cola](#)

Free UDT Models Resource on the Ignition Exchange

- Example set of UDT definitions
  - Bunker
  - CNC Machine
  - Conveyor
  - Dryer
  - Extruder
  - Hauloff
  - Lathe Machine
  - Opto 22 RIO EMU
  - Opto 22 RIO KYZ
  - Paint Booth

Available at:
https://inductiveautomation.com/exchange/2398/overview
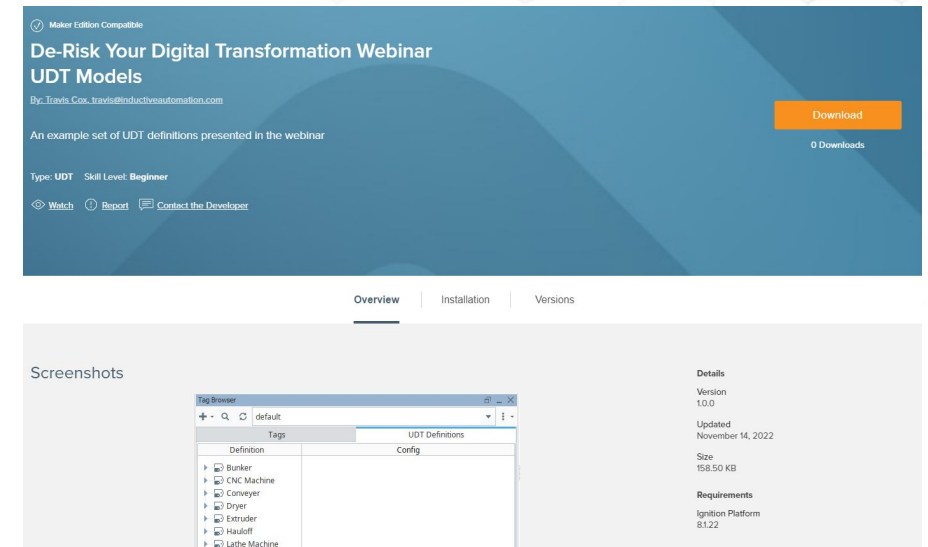
In Conclusion

- It's possible to get Digital Transformation started really quickly
- You can download everything you just saw and do it now!

Ready to Try Ignition for Yourself?

Download the full version for free at:
inductiveautomation.com

Azure Trial

Create Your Azure Free Account Today at:
https://azure.microsoft.com/en-in/free/

IoT Bridge for Azure Documentation

Learn more at:
https://docs.chariot.io/display/CLD80/IoT+Bridge+for+Azure

inductiveuniversity.com

Ignition User Manual also available at:

docs.inductiveautomation.com

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Contact International Distribution Manager Yegor Karnaukhov at: ykarnaukhov@inductiveautomation.com

Questions & Comments

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