NTT DATA
Services

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Project Omega – MVP Solution Concept for
Energy Management – Screen Examples
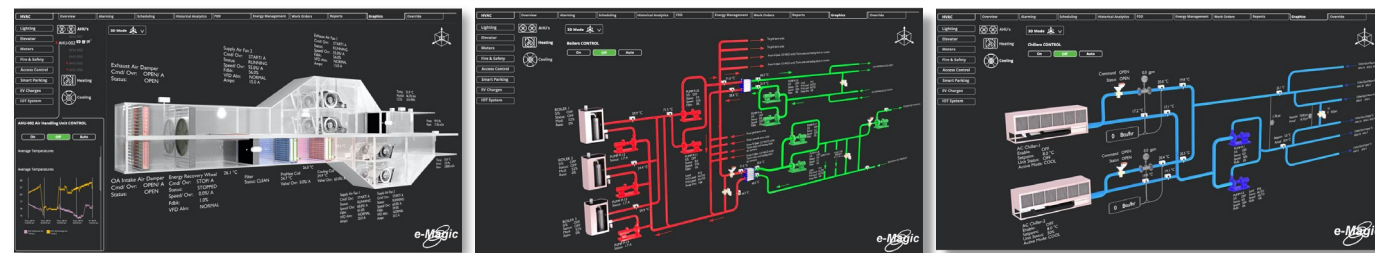
June 28, 2022

TwinWorX®

Scalable, secure and high-availability platform.

Integrate and normalize all telemetry data

Real-time and historical data
Single pane of glass visualization
Monitoring, alarming, fault detection & diagnosis
Workflows and business systems
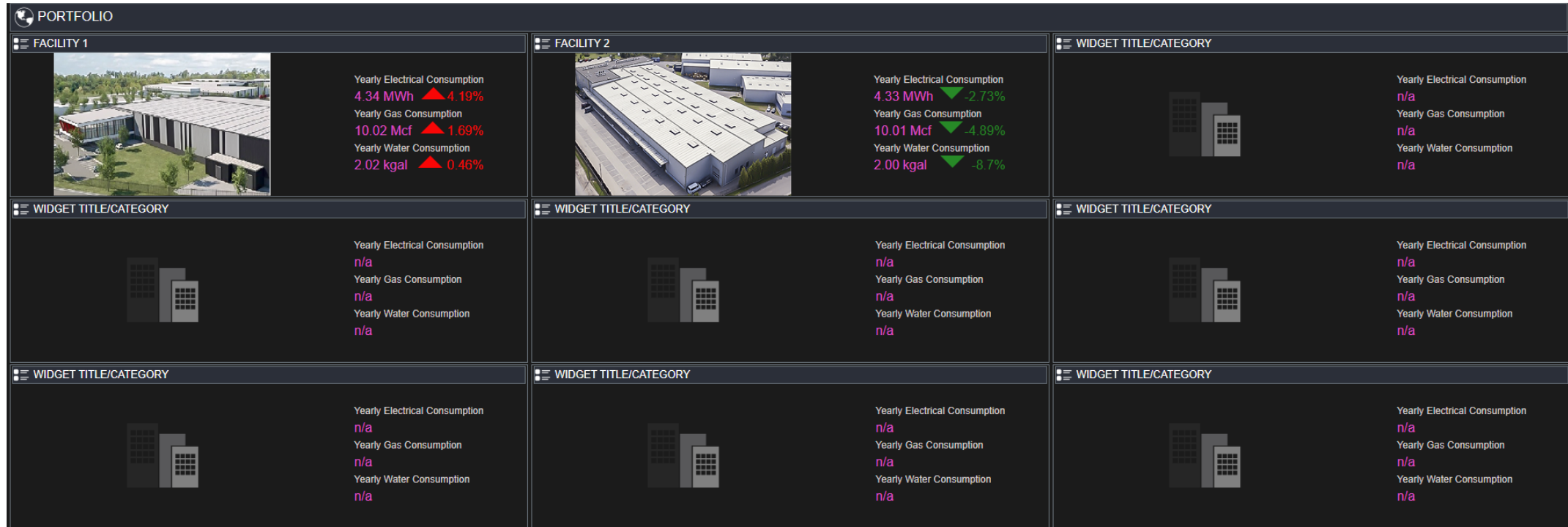Reporting, analytics, ML and AI
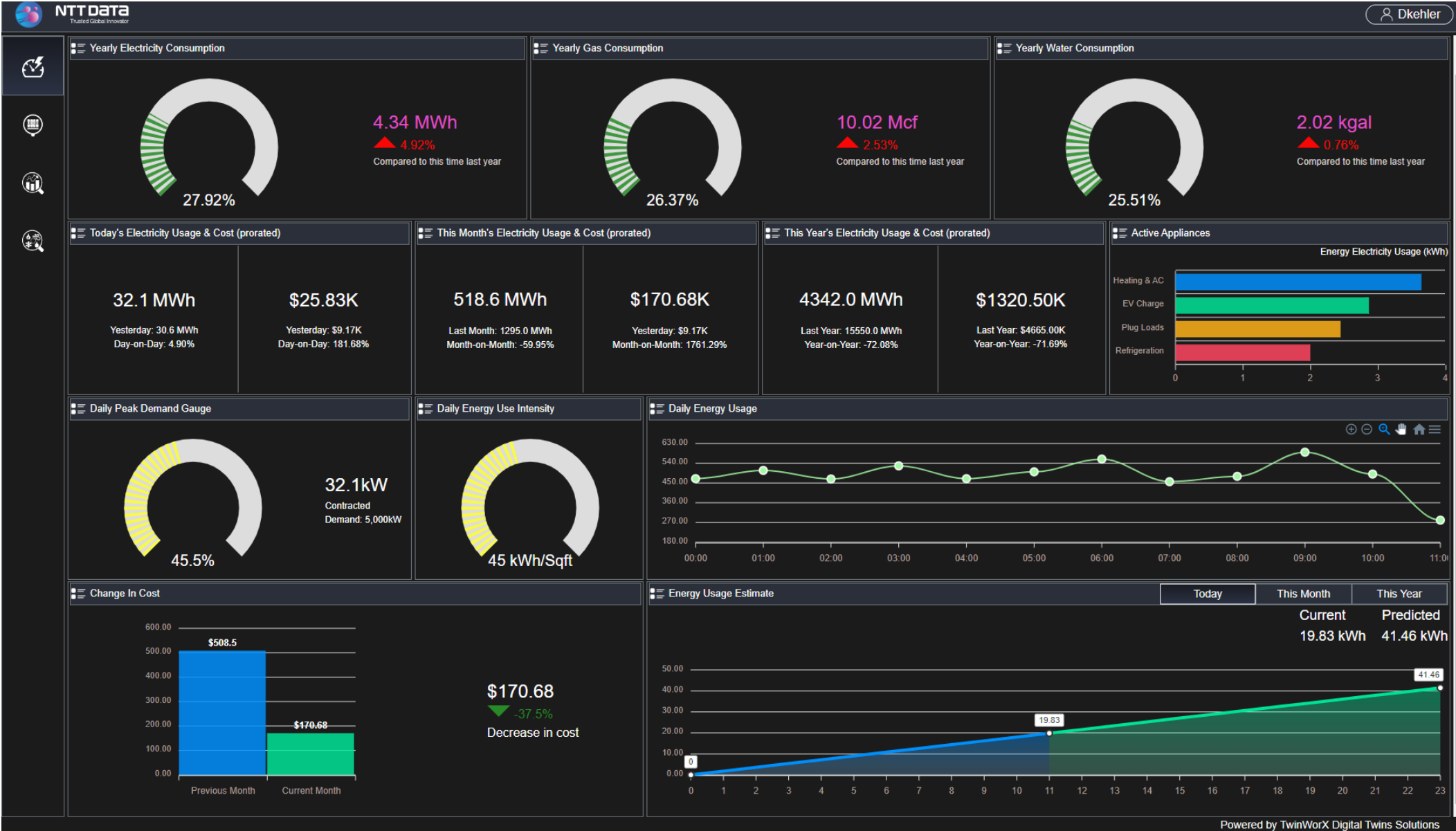
Use Case – Energy Use and Cost

- Situation Awareness of Current Energy Usage
- Meters: Electricity, Gas, Water
- Equipment: HVAC, AHU, etc.
- KPI's:
  - » Peak Demand
  - » Energy Use Intensity (energy per sq ft)
  - » Cost, Change in Cost
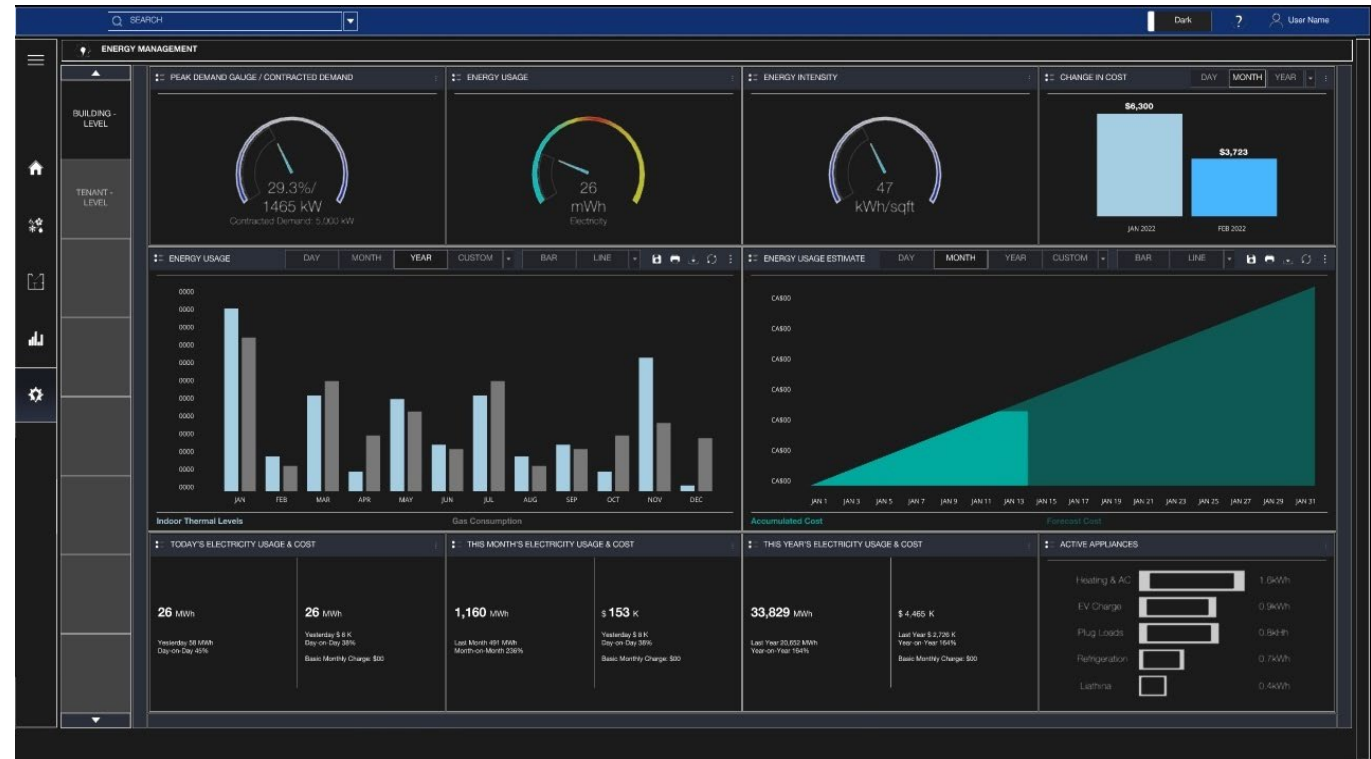
NTT DATA
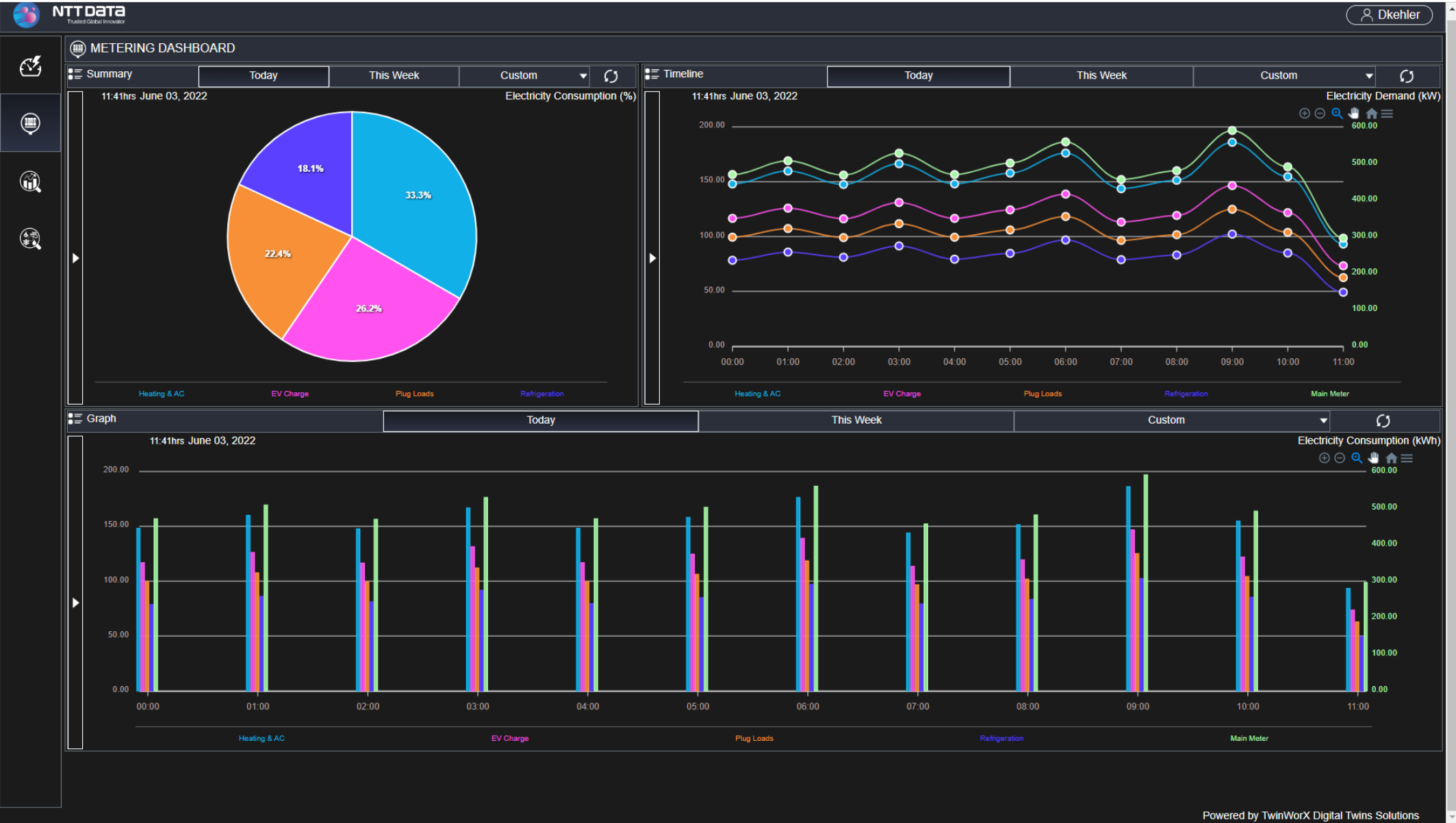
Portfolio View

Energy Dashboard

Metering Dashboard

Asset Library – Air Handling Unit

Fault Detection & Diagnostics

FAULT DETECTION AND DIAGONISTICS — Query Digital Twins

Active Faults | Historical Faults | Analytics

Show 25 entries   Search:

BLDG	Location	Asset	Fault Name	Fault Activated Time	Fault Status	Potential Savings($)	Rule Categories
ASTARC	FLR_01	AHU1	Heating Failure	2022-02-24T19:31:00	ACTIVE	0	Fault, Energy, Maintenance
ASTARC	FLR_02	AHU3	Heating Failure	2022-02-24T19:31:00	ACTIVE	1000	Fault, Energy, Maintenance
ASTARC	FLR_02	AHU3	Cooling Valve Leaking	2022-03-26T19:31:00	ACTIVE	1100	Energy, Maintenance
ASTARC	FLR_01	AHU1	Cooling and Heating Simultaneously	2022-03-15T19:31:00	ACTIVE	1500	Energy, Maintenance
ASTARC	FLR_01	AHU1	Cooling Failure	2022-04-04T09:31:00	ACTIVE	1500	Fault, Energy, Maintenance
ASTARC	FLR_01	AHU1	Cooling and Heating Simultaneously	2022-03-11T09:31:00	ACTIVE	1500	Energy, Maintenance
ASTARC	FLR_02	AHU3	Cooling Failure	2022-02-24T05:02:00	ACTIVE	1000	Fault, Energy, Maintenance
ASTARC	FLR_01	AHU1	Cooling Valve Leaking	2022-03-26T19:31:00	ACTIVE	1100	Energy, Maintenance
ASTARC	FLR_02	AHU3	High Return CO2 Levels	2022-02-05T06:02:00	ACTIVE	1000	Comfort, Maintenance
ASTARC	FLR_01	AHU1	High Return Air Temperature	2022-04-07T06:02:00	ACTIVE	500	Energy
ASTARC	FLR_01	AHU1	Zone Humidity Outside of Comfort Limits	2022-03-17T11:15:00	ACTIVE	750	Comfort
ASTARC	BASEMENT	CH1	Chiller Running During Unoccupied Periods	2022-04-15T19:31:00	ACTIVE	3000	Energy
ASTARC	BASEMENT	BLR1	Boiler Running During Unoccupied Periods	2022-02-15T03:03:00	ACTIVE	4500	Energy
ASTARC	BASEMENT	BLR2	Boiler Running During Unoccupied Periods	2022-01-21T03:03:00	ACTIVE	4500	Energy
ASTARC	BASEMENT	BLR3	Boiler Running During Unoccupied Periods	2022-01-26T03:03:00	ACTIVE	4500	Energy
ASTARC	BASEMENT	BLR1	Boiler Running During Unoccupied Periods	2022-04-15T19:31:00	ACTIVE	4500	Energy
ASTARC	FLR_02	AHU3	High Return Air Temperature	2022-04-02T06:02:00	ACTIVE	500	Energy
ASTARC	FLR_02	AHU3	Cooling Valve Leaking	2022-02-20T05:23:00	ACTIVE	1100	Energy, Maintenance
ASTARC	FLR_01	AHU1	Cooling and Heating Simultaneously	2022-03-11T09:31:00	ACTIVE	1500	Energy, Maintenance
ASTARC	FLR_02	AHU3	High Return Air Temperature	2022-04-02T06:02:00	ACTIVE	500	Energy
ASTARC	FLR_02	AHU3	Zone Humidity Outside of Comfort Limits	2022-03-17T11:15:00	ACTIVE	750	Comfort
ASTARC	BASEMENT	CH1	Chiller Running During Unoccupied Periods	2022-03-26T19:31:00	ACTIVE	3000	Energy
ASTARC	BASEMENT	CH2	Chiller Running During Unoccupied Periods	2022-04-04T13:03:00	ACTIVE	3000	Energy
ASTARC	FLR_01	AHU1	High Return CO2 Levels	2022-03-24T09:31:00	ACTIVE	1500	Comfort, Maintenance
ASTARC	FLR_02	AHU3	High Return CO2 Levels	2022-02-05T06:02:00	ACTIVE	1000	Comfort, Maintenance

Showing 1 to 25 of 35 entries

Previous 1 2 Next

Powered by TwinWorX Digital Twins Solutions

NTT DATA

Fault Detection and Diagnosis (FDD)

- Address issues impacting energy use and waste
- Algorithms based on Human Understanding of equipment problems
- Recommendations for correction
- Project cost savings $ to support prioritization

Fault Name	Fault Activated Time	Fault Status	Potential Savings($)	Rule Categories
Heating Failure	2022-02-24T19:31:00	ACTIVE	0	Fault, Energy, Maintenance
Heating Failure	2022-02-24T19:31:00	ACTIVE	1000	Fault, Energy, Maintenance
Cooling Valve Leaking	2022-03-26T19:31:00	ACTIVE	1100	Energy, Maintenance
Cooling and Heating Simultaneously	2022-03-15T19:31:00	ACTIVE	1500	Energy, Maintenance
Cooling Failure	2022-04-04T09:31:00	ACTIVE	1500	Fault, Energy, Maintenance
Cooling and Heating Simultaneously	2022-03-11T09:31:00	ACTIVE	1500	Energy, Maintenance
Cooling Failure	2022-02-24T05:02:00	ACTIVE	1000	Fault, Energy, Maintenance
Cooling Valve Leaking	2022-03-26T19:31:00	ACTIVE	1100	Energy, Maintenance
High Return CO2 Levels	2022-02-05T06:02:00	ACTIVE	1000	Comfort, Maintenance
High Return Air Temperature	2022-04-07T06:02:00	ACTIVE	500	Energy
Zone Humidity Outside of Comfort Limits	2022-03-17T11:15:00	ACTIVE	750	Comfort
Chiller Running During Unoccupied Periods	2022-04-15T19:31:00	ACTIVE	3000	Energy

https://ntt1.eastus.cloudapp.azure.com/ClientApp/graphics/Description.html?faultGuid=b0ac52bb-729f-40b8-87aa-d57c5749423c - Googl...

ntt1.eastus.cloudapp.azure.com/ClientApp/graphics/Description.html?faultGuid=b0ac52bb-729f-40b8-87aa-d57c5749423c

Fault Description:

This rule detects when the AHU fails to reach the requested level of heating. The Discharge Air Temperature is too low, and should be higher than the Mixed Air Temperature.

Probable Causes:

For a given amount of time, the Heating Valve Position greater than a threshold and the Discharge Air Fan in ON, Mixed Air Temperature is within a threshold of the Discharge Air Temperature.

Possible Solution:

Check proper function of Discharge Air Temperature sensor Check proper function of Mixed Air Temperature sensor Check cooling coil valve Check heating coil valve Check that flow through heating coil is uninterrupted Check that heating coil hot water temperature is at or near setpoint

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FDD Analytics and Insights

- Identify areas with most issues
- Understand impact of action / inaction
- Prioritize and schedule
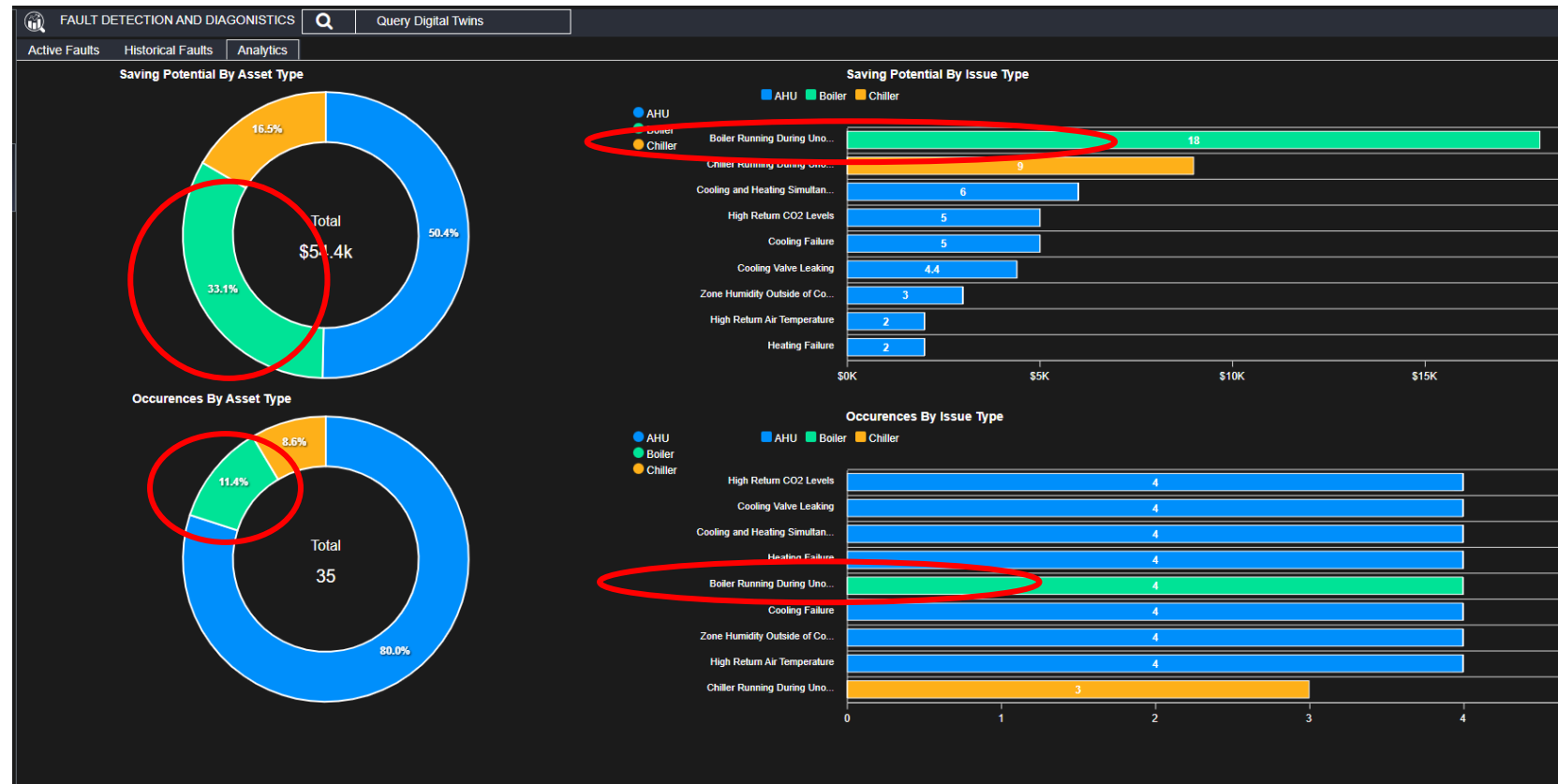
Issues and Cost concentrated on 'Boiler Room'

NTT DATA

Digital Twins Query Example

- Powerful queries driven by Digital Twins Definition Language (DTDL)
- Query multiple data sets connected to the twin
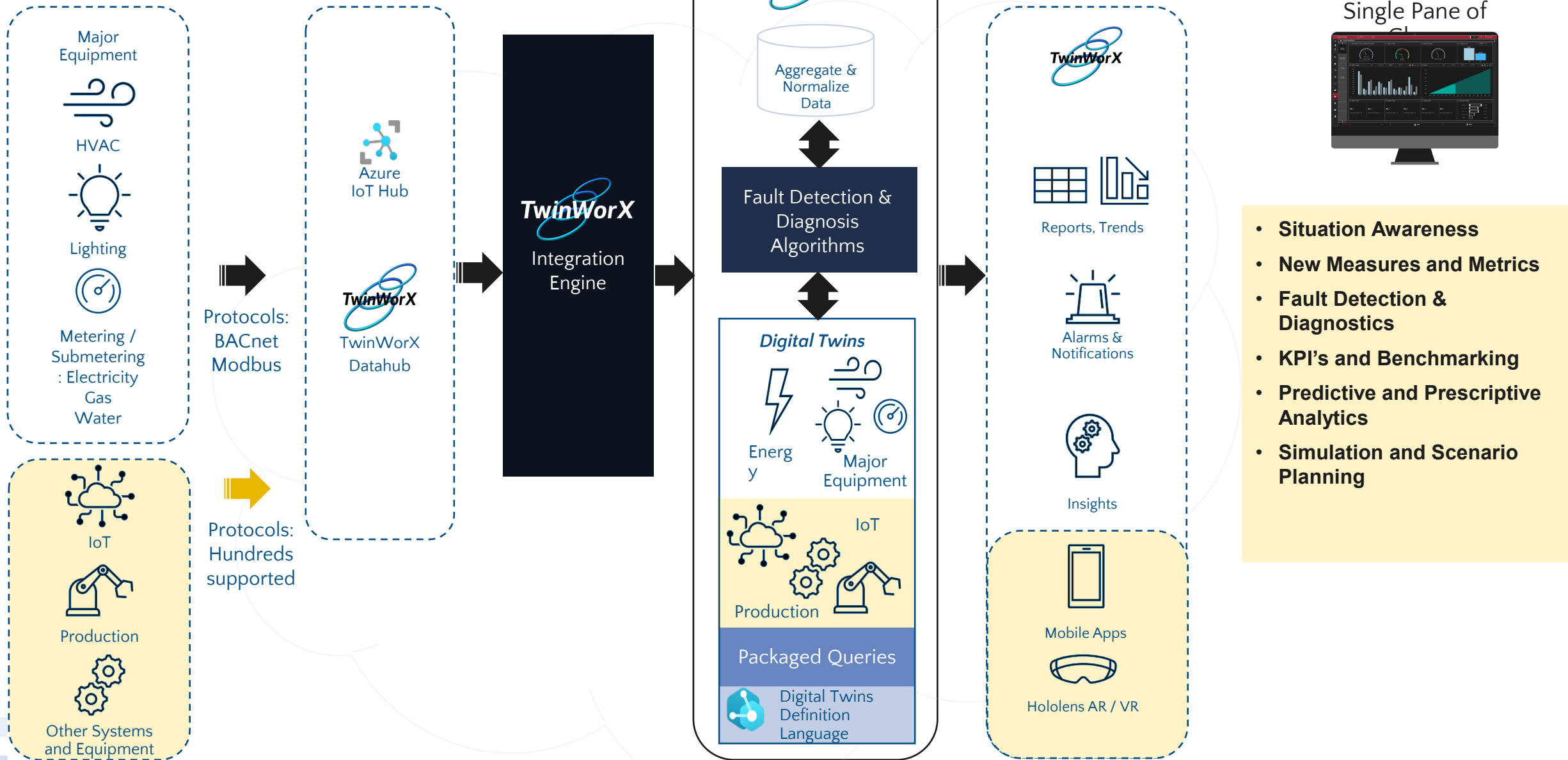- Contextual understanding and insight

Insights based on: AHU twin, Historian Data, FDD Faults, Vendor Information

Beyond the MVP – Extend, Scale

Major Equipment
- HVAC
- Lighting
- Metering / Submetering : Electricity Gas Water

IoT
- Production
- Other Systems and Equipment

Protocols: BACnet Modbus

Protocols: Hundreds supported

Azure IoT Hub

TwinWorX Datahub

TwinWorX Integration Engine

Aggregate & Normalize Data

Fault Detection & Diagnosis Algorithms

Digital Twins
- Energy
- Major Equipment
- IoT
- Production

Packaged Queries

Digital Twins Definition Language

Reports, Trends

Alarms & Notifications

Insights

Mobile Apps

Hololens AR / VR

Single Pane of

- **Situation Awareness**
- **New Measures and Metrics**
- **Fault Detection & Diagnostics**
- **KPI's and Benchmarking**
- **Predictive and Prescriptive Analytics**
- **Simulation and Scenario Planning**

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