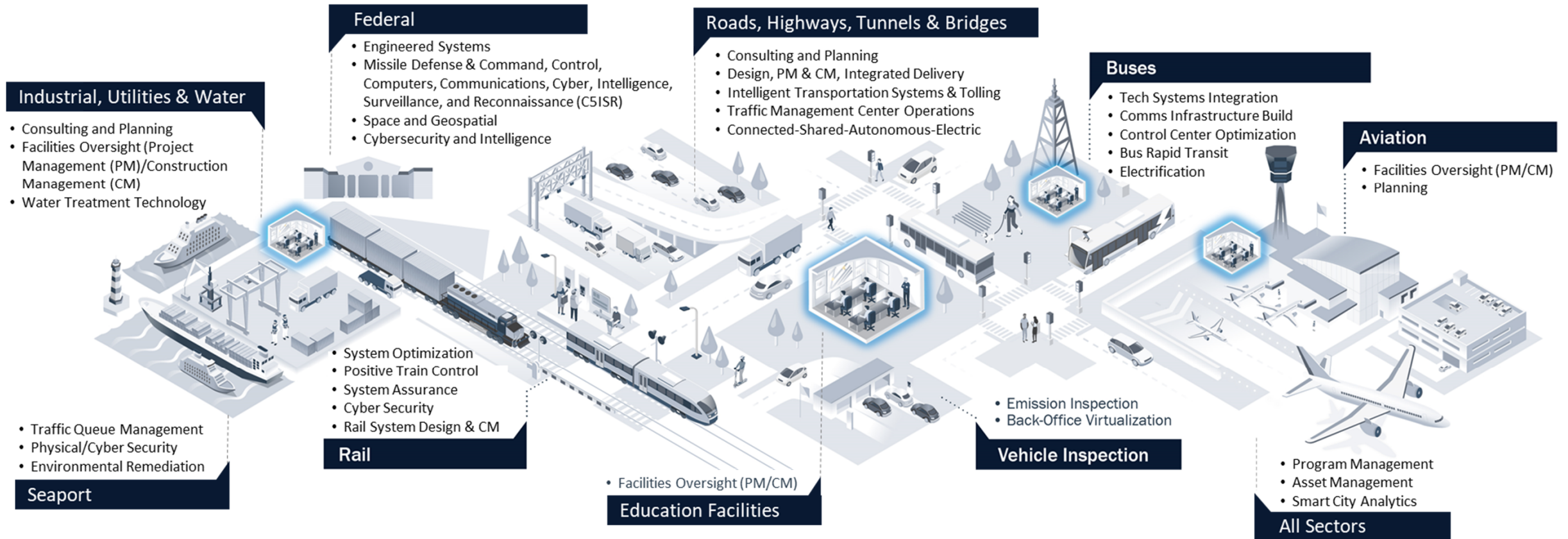


# Implementing an Operational Digital Twin at a Major International Airport

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Director, BIM Digital Practice

# About Parsons and Parsons X



Parsons X provides digitally enabled solutions and services for Aviation, Transportation, Rail, Ports, Utilities, US Federal Agencies, the Department of Defense, and municipalities worldwide. We help foster the digital transformation of critical infrastructure by delivering GIS Systems, Program Management Information Systems, Enterprise Asset Management Systems, and Smart City Analytics.

# Digital Business Drivers and Digital Twin Concepts

➤ Implement a digital twin to provide end-to-end visibility of assets during their entire life cycle through a **single pane of glass**.

Increases efficiency, performance and availability of the assets.

- Create a digital strategy and governance plan for future construction projects using the digital twin
- Increase efficiency and advance sustainability by creating a digitized infrastructure with Internet of Things (IoT), allowing the assessment and visualization of the operational health of the infrastructure
- Improve communication, awareness, and coordination through immersive visualization with federated access to large amounts of otherwise siloed data
- Improve decision making through analytics and simulations
- Real-time and predictive alerts where various conditions of assets are tracked, and responsible parties are notified before, or as soon as maintenance or emergency situations arise



# Airport Project Overview

- Focus on asset management, energy efficiency, and situational awareness
- Implement a Digital Infrastructure Platform (DIP) solution based on a commercial off-the-shelf product
- Twin a newly rehabilitated runway
- Twin the Central Utility Plant (CUP)
- Twin a recently expanded terminal
- Integrate with the building automation systems, enterprise asset management systems, and sensors
- Work with the National Renewable Energy Lab on a predictive energy model
- Optimize the cost of airport modernization





# Operational Digital Twin



Provides visibility into all historical and current aspects of the airport's assets to better manage and improve operations

Seamlessly builds upon the current asset knowledge base across various asset phases and sources

Provides a single, integrated solution that can be used for all phases of the asset's lifecycle by all stakeholders

Improves management of the airport facilities to increase operational performance, efficiency, and availability of the assets

Runway -  
AutoCAD  
Civil 3D CAD

ESRI GIS  
Site Content

Veoci EAM  
Part 139  
Work Orders

Lufft ViewMondo  
Runway Sensors

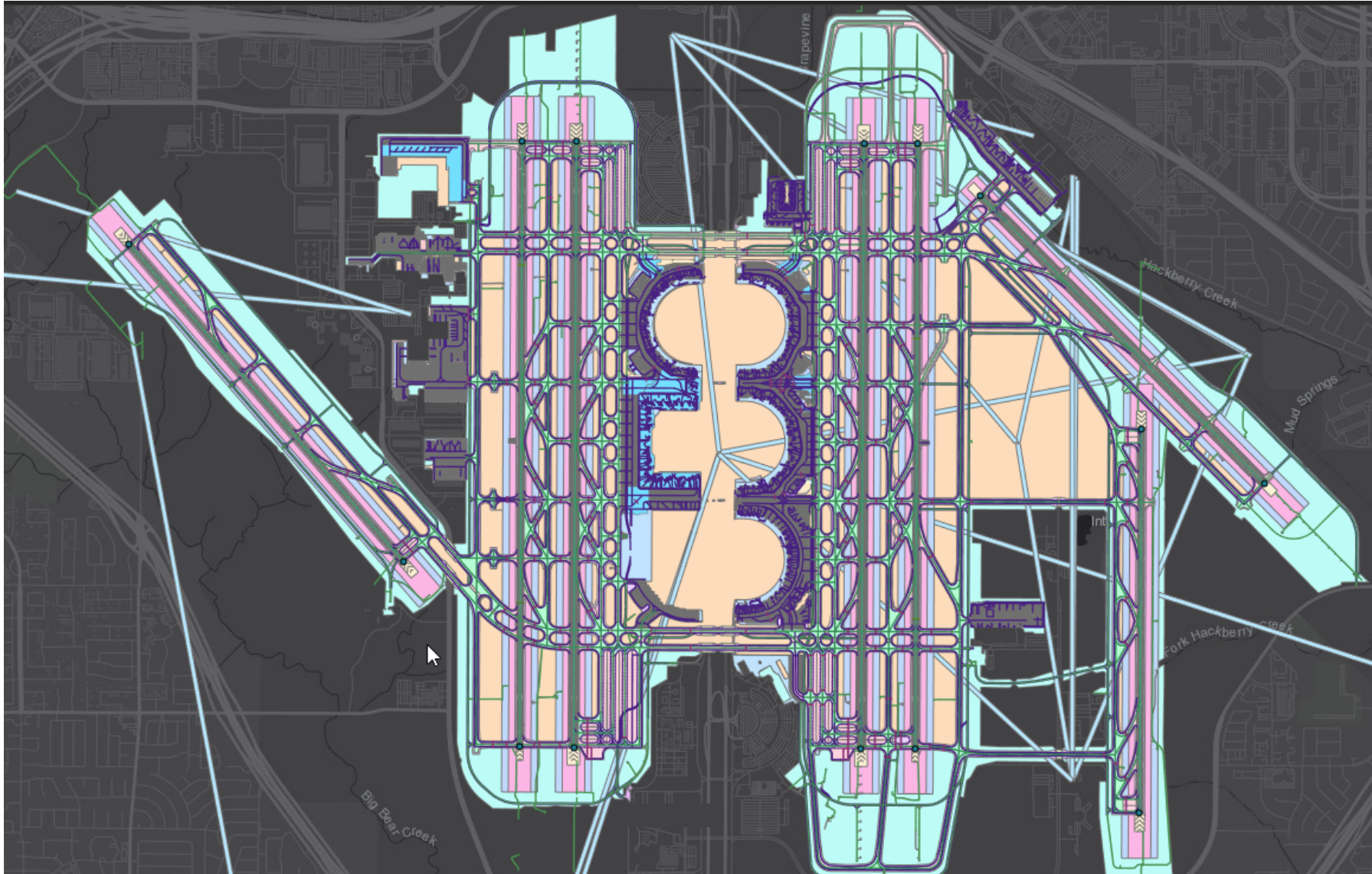
INFOR EAM  
Work Orders

Terminal -  
Revit 3D  
BIM

Johnson Controls  
Building Mg  
System (BMS)

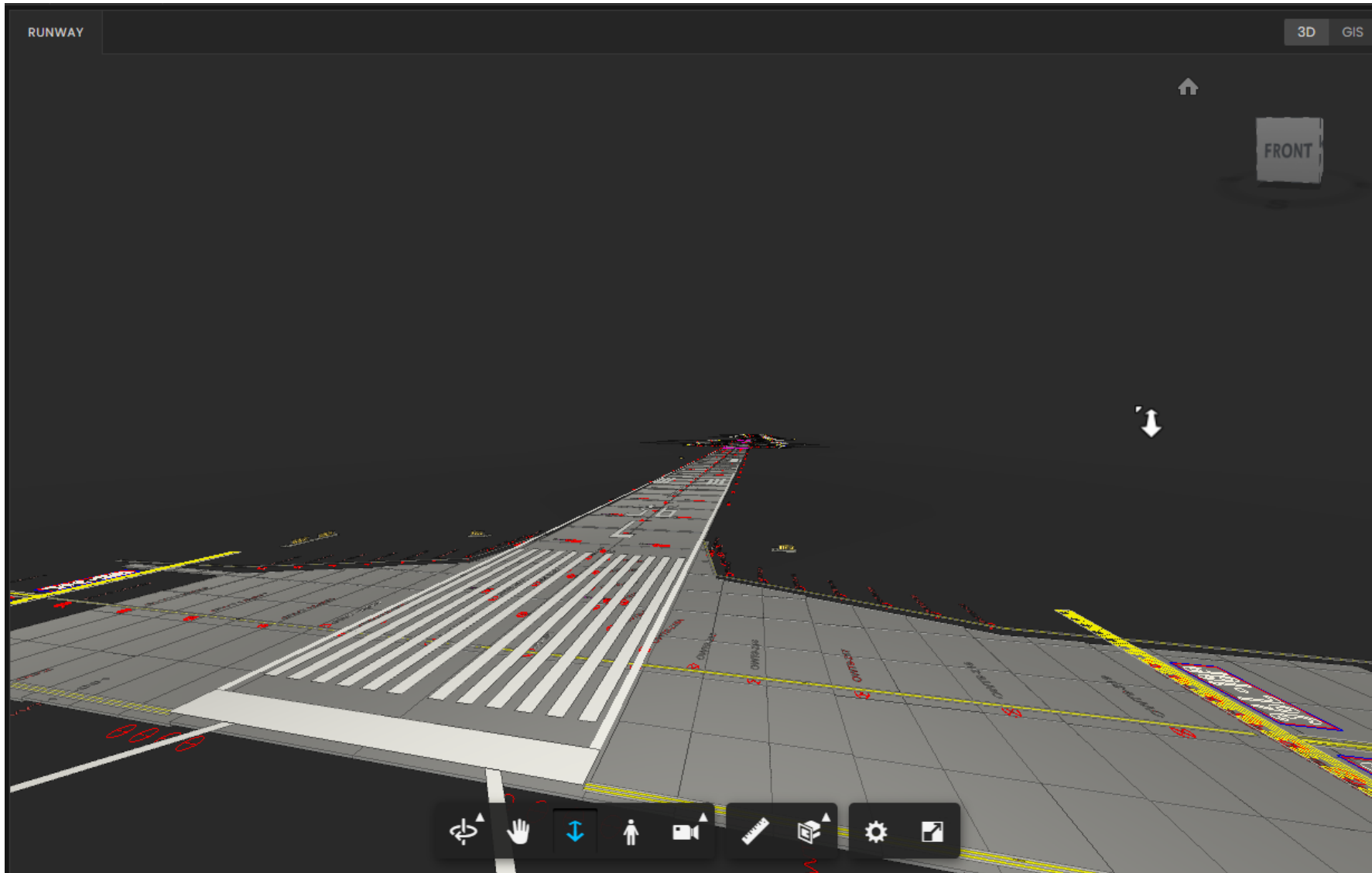
WebTMA

# GIS Integration Map





# Runway Paving, Markings, Lights, and Signs





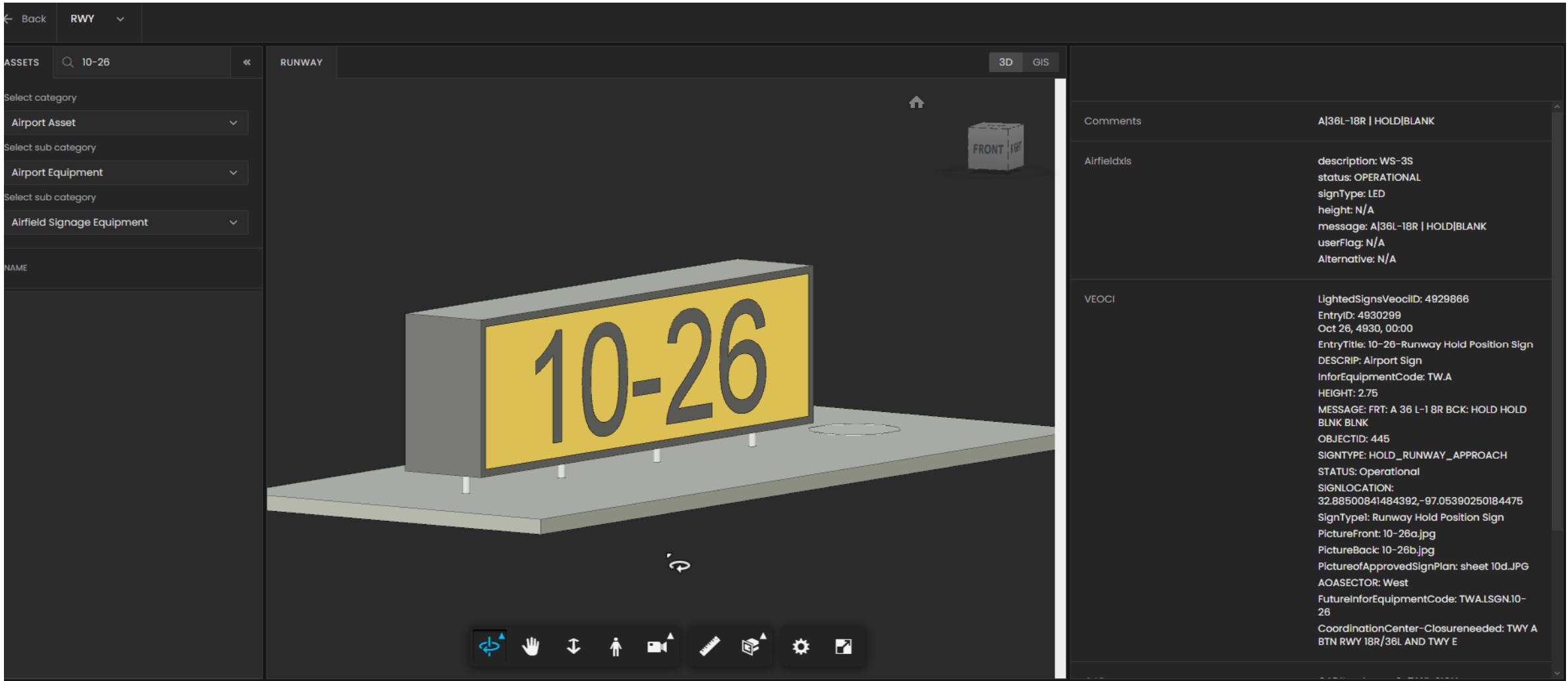
# Runway Weather Station Live IOT Integration





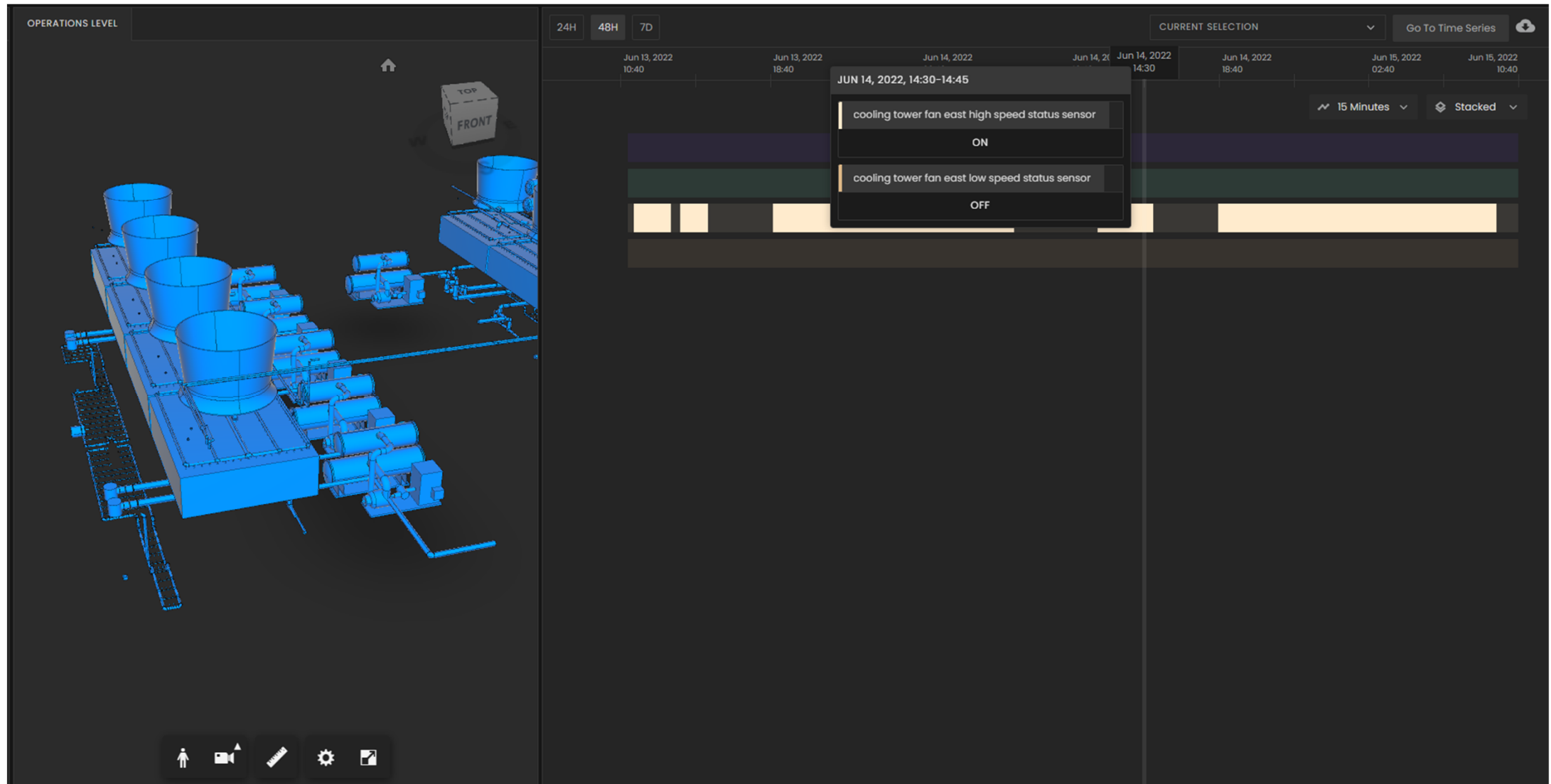
# Runway Weather Station Time Series Live Data



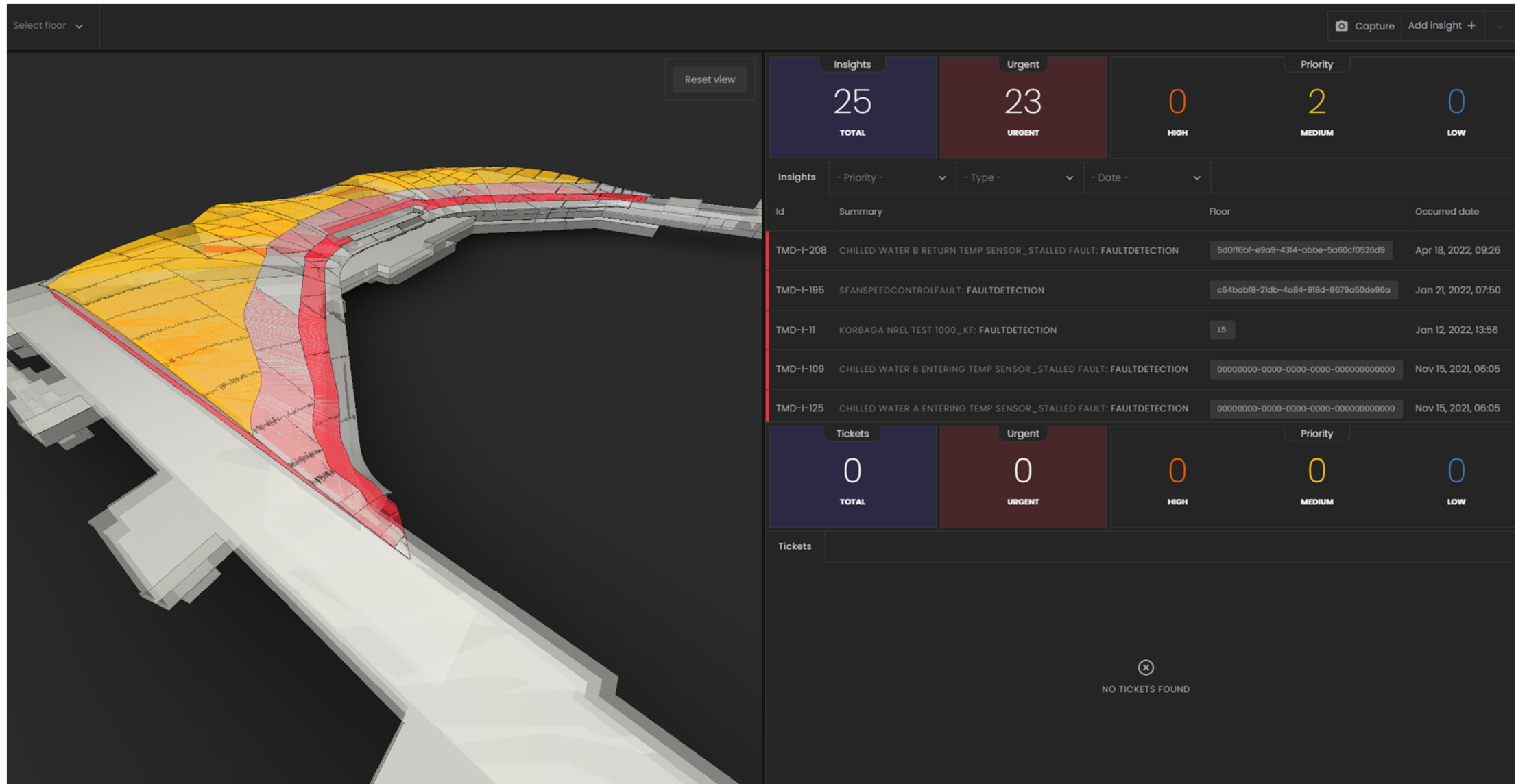




# Central Utility Plant with Operational Sensor Integration



# Terminal Linked to BMS and EAM System Data & Sensors



# Terminal Asset Linked to Multiple Source Systems

The screenshot displays a BIM software interface with a 3D model of an Air Handling Unit (AHU) and a sidebar containing asset information.

**Assets Panel (Left):**

- Search: - Search -
- Select category: Equipment
- Select sub category: HVAC Equipment
- Select sub category: Air Handling Unit
- NAME: DFWAA-DFWA-AHU-1-1 Air Handling Unit AHU 1-1
- DFWAA-DFWA-AHU-1-5 Air Handling Unit AHU 1-5

**3D Model (Center):**

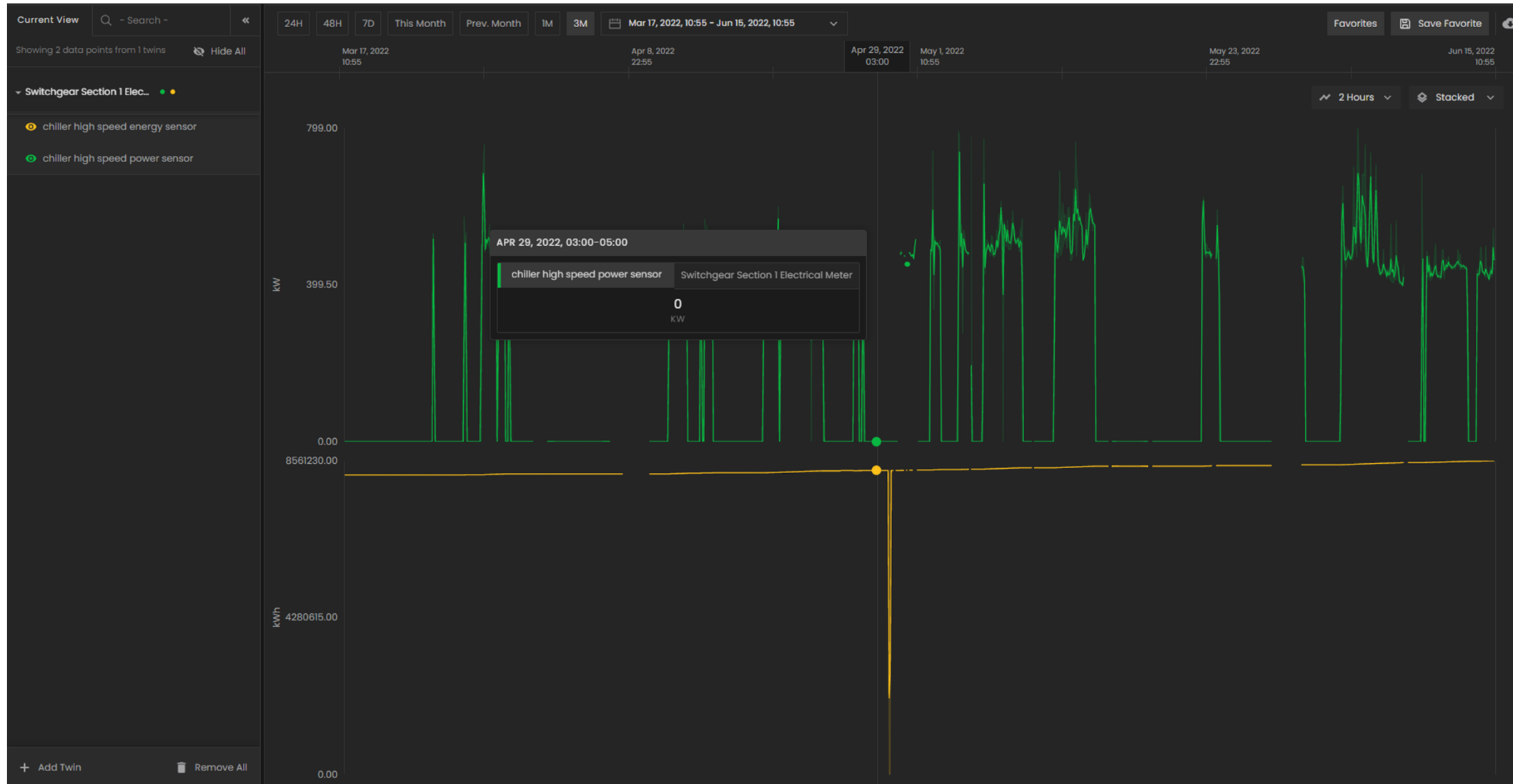
- Arrivals Level
- Air Handling Unit AHU 1-1 (highlighted in blue)
- BACK LEFT (directional arrow)

**Asset Information Panel (Right):**

- DFWAA-DFWA-AHU-1-1 Air Handling Unit AHU 1-1
- Comments: Uploaded 05/27/2022
- Parsons: BIM\_Metasyms\_INFOR\_Comments: INFOR AHU# matched to BIM Mark (Join) locatedInRoom: D RM-D-D29L119 Metasyms\_INFOR\_Crosswalk\_Comments: Metasyms Unit # manually matched to AHU# in INFOR description INFOR\_Comments: No Primary System INFOR\_Metasyms\_Mark: AHU 1-1 metasymsComments: No Area Served/Box #
- INFOR: Asset: 33260.ARHD.090 Description: AIR HANDLER 1-1 D29L119101 Status: Installed Department: D.TERM.MEPS Class: HVAC Category: ARHD CommissionDate: 08/29/2005 OutofService: NO CostCode: 0102-245-00000-00-00-0 Location: D.33260.TRMX Manufacturer: TEMTROL
- Metasyms: UnitType: CV UnitNumber: 1-01 NAE\_Name: Level 1 North
- Revit: Id: 287730:8126622 ElementID\_Value: 8126622 FamilyName: WIL\_VAV\_AHU - Outlet centered FamilyAndType: WIL\_VAV\_AHU - Outlet centered: AHU 1-5 Mark: AHU 1-1 Level: LEVEL 01 - HVAC ARRIVAL RVT\_TypeFileName: WIL\_DFW\_ME\_Terminal D\_HVAC\_North\_U1\_R211 OmniClassNumber: 23.75.35.14.14 Category: Mechanical Equipment



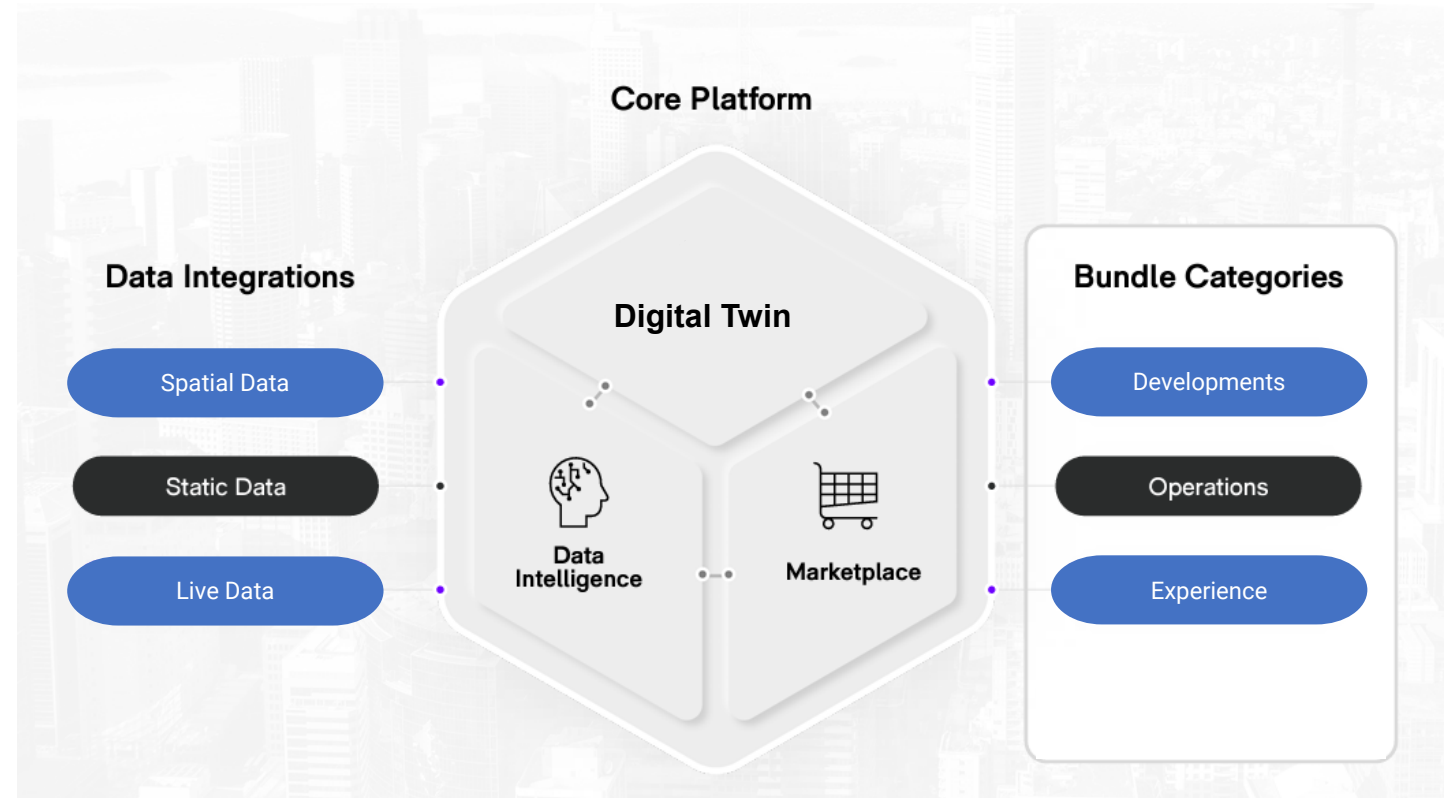
# Time Series Analytics from Sensor Data





# Implementation and Integration Overview

- Define Digital Governance Standards
- Provide a cloud-based DT platform
- Link GIS services, CAD & BIM models to the platform
- Develop live integrations with legacy systems
  - Enterprise asset management and maintenance ticketing
  - Building management systems
  - Runway inspection database
  - GIS mapping
  - Sensor data



Example non-specific, non-exhaustive solution summary



# Implementation and Integration Process

## 1. Asset Data

Identify the assets and compare tabular asset data from the airport to the spatial assets identified

Upload relevant assets into the DT

## 2. Spatial Data

Upload spatial information to the DT and link asset data to the spatial data via graphical user IDs (GUIDs)

Users can see the asset data associated with model elements

## 3. Pre-Integration

Review airport documentation

Establish an integration strategy

## 6. Training

Provide training for airport users intended to interact with the platform

## 5. Data Sharing & Applications

Third party integrations configuration of the Building Dashboard

Implementation of the Rules Engine

## 4. Integration & Data Acquisition

Configure software connectors to identified systems

Scan live data

Map systems and configure rules engines



# Implementation Activities

- Review existing airport digital strategy and governance documentation
  - Enhance strategy to help use digital data provided by design, construction, and commissioning teams on future capital projects
- BIM Interoperability and Dynamo Model Checking
- Comply with the airport's Information Security procedures
- Install platform and configure
- Provide the airport team with in-depth training of the platform and ensure access to the resources required to keep training current and up to date





# Lessons Learned

- 3D is expensive
- Define realistic expectations. This is a marathon, not a sprint.
- Beware of legacy building/process control systems
- Fund through Capital Construction Program
- Implement an Integration Platform
- Sensors need connectivity
- Data Quality is important
- Data Governance is important

# Thank you!

Questions?



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# Roadmap

- Align the user experience with personas and workflows
- Add runways and terminals to platform incrementally over next 5 years
- Integrate with the Central Utility Plant (CUP)
- Implement bi-directional integration to work order systems
- Develop enhanced data analysis and strategic reporting
- Further define the roadmap
- Define additional high-value use cases
- Develop a staffing plan
- Define better ROI

SUCCESS

