Digital Twin

Shaping Critical Infrastructure in Urban Sphere

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Smart Urban Communities have many faces …

The major business challenges for Smart Urban Infrastructure

Resilience

Develop a high adaptability to varying and changing demands

Create synergies between assets, data, technology and a digitally engaged community

Encourage new business models

Create real estate value

Ensure maximum value generation & cost-optimized operation through data

A thriving ecosystem attracting investment and jobs

Revenues & profitability optimized CAPEX & OPEX

Comfort & convenience creating technologies

Sustainability

Drive net Zero carbon emission

Attractive, livable and inclusive campus

Attracting environment-conscious people

Resource efficient

Quality of Life

Provide a world-class destination

Maintain attractiveness for tenants and visitors

Reliable, comfortable & convenient infrastructure

Ease of navigation on-site/campus and implementation of real-time location services

Safe and healthy infrastructure

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Most digital transformations fail, but the world is still waiting on an easy digitalization concept

Digitalization challenges

86% have avoided critical projects due to complexity of legacy systems

45% don't know where to begin to adopt IoT

40% struggle to find digital partners with experience in their industry

Key to success

Easy — Simple access to the latest technologies that are easy to integrate, adopt, and build upon

Flexible — Modular and interoperable concept to pick products, solutions, and services throughout the entire lifecycle

Open Eco-system — Ecosystem bringing together best-in-class players across the market

Sources: The Forrester Wave: Global IoT Services for Connected Business Operations, Harvard Business Analytic Services Internet of Things Report for Siemens

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Why Digital Twin is the need of the hour?

Information Search

Outdated Data

Incomplete Information

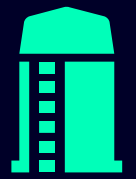
Information Location

Time Consuming

Handover Delay

Asset Location Issue

No Updated data



Data Silo

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Why Digital Twin is the need of the hour?

Laborious Budget Estimation

Hard Manual Assessment

Unsafe Asset Location

Inefficient Onboarding

Work Order Delay

Unintuitive Problem Solving

Insurance Risk Management

Slow Inspection

Incomplete Space Planning

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A single pane of glass intersects information siloes

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Where is Geospatial in the sphere of Digital Twin?

Digital Twin = BIM + GIS + Photogrammetry + IoT + FM + Asset Management..

BIM

Building Information Modeling is the linking of people, processes and technology for improved outcome in built environment.

GIS

A geographic information system (GIS) is a system designed to capture, store, manipulate, analyze, manage, and present all types of geographical data. Everything spatial & location intelligence conforms to GIS.

Photogrammetry

Photogrammetry is the science of making measurements from photographs. Use of drone data, 360 degree images, laser scanning can create photogrammetrically generated 3D reality models for creating contextual data.

Internet of Things (IoT) :

The network of devices with internet connectivity that can connect, interact and exchange data

Facility Management

Asset Information Management

Efficient Asset monitoring & increase asset lifetime.

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Siemens Digital Twin

BIM & Common Data Environment (CDE)

Data Integration Platform

Lifecycle Twin

Asset Lifecycle Information Management Platform
ISO19650 Process and Lifecycle management.

Level of information

- Planning
- Geometry BIM Authoring
- Handover to Construction
- Project Mgmt.
- Commissioning
- Handover to FM
- Work Order Mgmt.
- Space Management
- Building Automation
- Analytics
- Handover to Design
- BIM Updates

Data Collection & Quality

Data Analytics & Data Maintenance

t

Design → Construction → Operations → Renovation

- Project Information Model
- BIM Model information Mgmt.
- Document Mgmt.
- iPad data capture
- iPad Digital inspection forms
- Issue Mgmt.
- Quality Control

3D View from BIM and Point Clouds
Asset Information Model
Document Mgmt.
Real time and historic readings
Work orders / Alarms
System connectivity
Data simulations
Animations

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Single Pane of Glass

3D

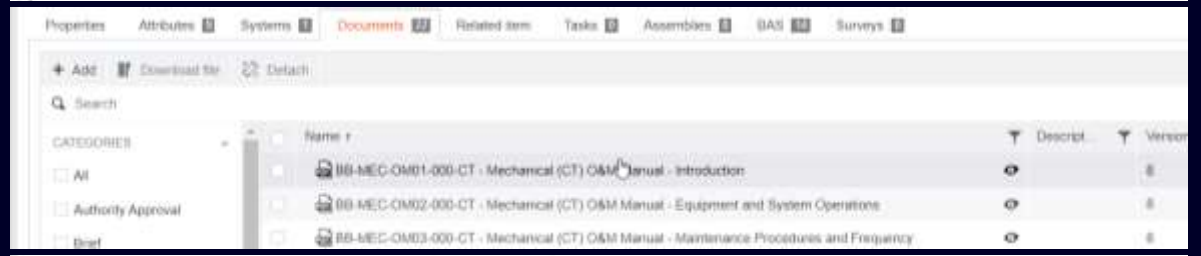
Floor Plan

Sensors

Profile

Systems

Documents



Related Items

Work Orders

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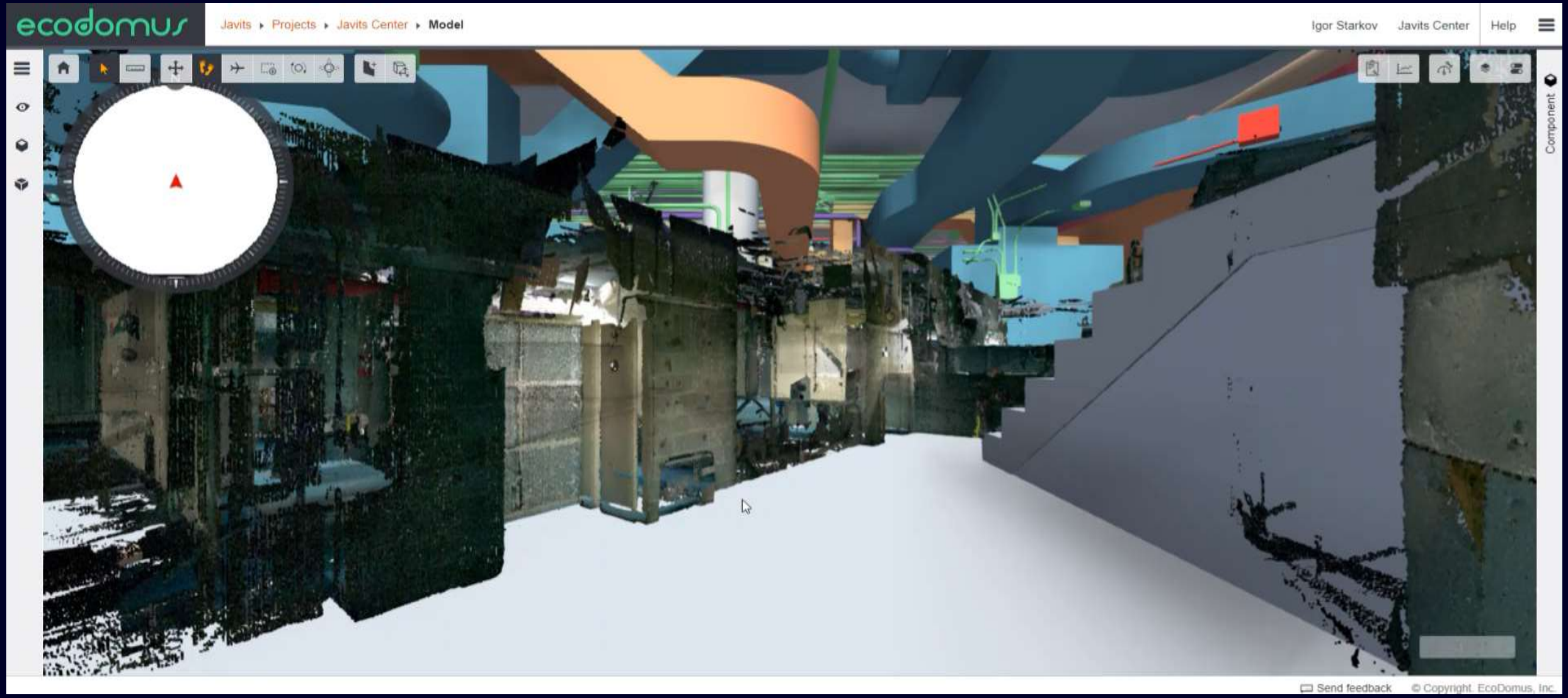
Geospatial & BIM Data – Setting the data foundation block



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How can I ensure a quick response to unforeseen maintenance?

Use case 1

Proactive maintenance during operation

Reactive maintenance refers to ad-hoc maintenance and repair tasks, due to unforeseen aging and equipment breakage. Being able to swiftly react, identify and fix the source of the disruption is paramount. Plumbing leaks are a classic example.

Pain points

Lack of information during source identification and localization of nearest upstream valve

Investigation takes time and increases the chance of severe flooding and additional equipment damage

Inaccurate localization of the leak can lead to collateral damage to walls and ceilings

Risk of surging insurance premiums, downtime and reputational damage

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Proactive Maintenance during Operations

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How do I enable preventive maintenance to extend asset lifetime?

Use case 3

Preventive maintenance during operation

Preventive maintenance is a key activity in asset management to ensure high system availability and extend the lifetime of sensitive and critical equipment. In case of servicing condensers of an AC systems, preventive maintenance can be challenging without technical information available.

Pain points

Lack of technical information, such as upstream and downstream relationships: which condenser feeds which unit?

Faded labels on condensers

Replacing the wrong parts may lead to breakdowns

Using the wrong refrigerant type can lead to system shutdowns

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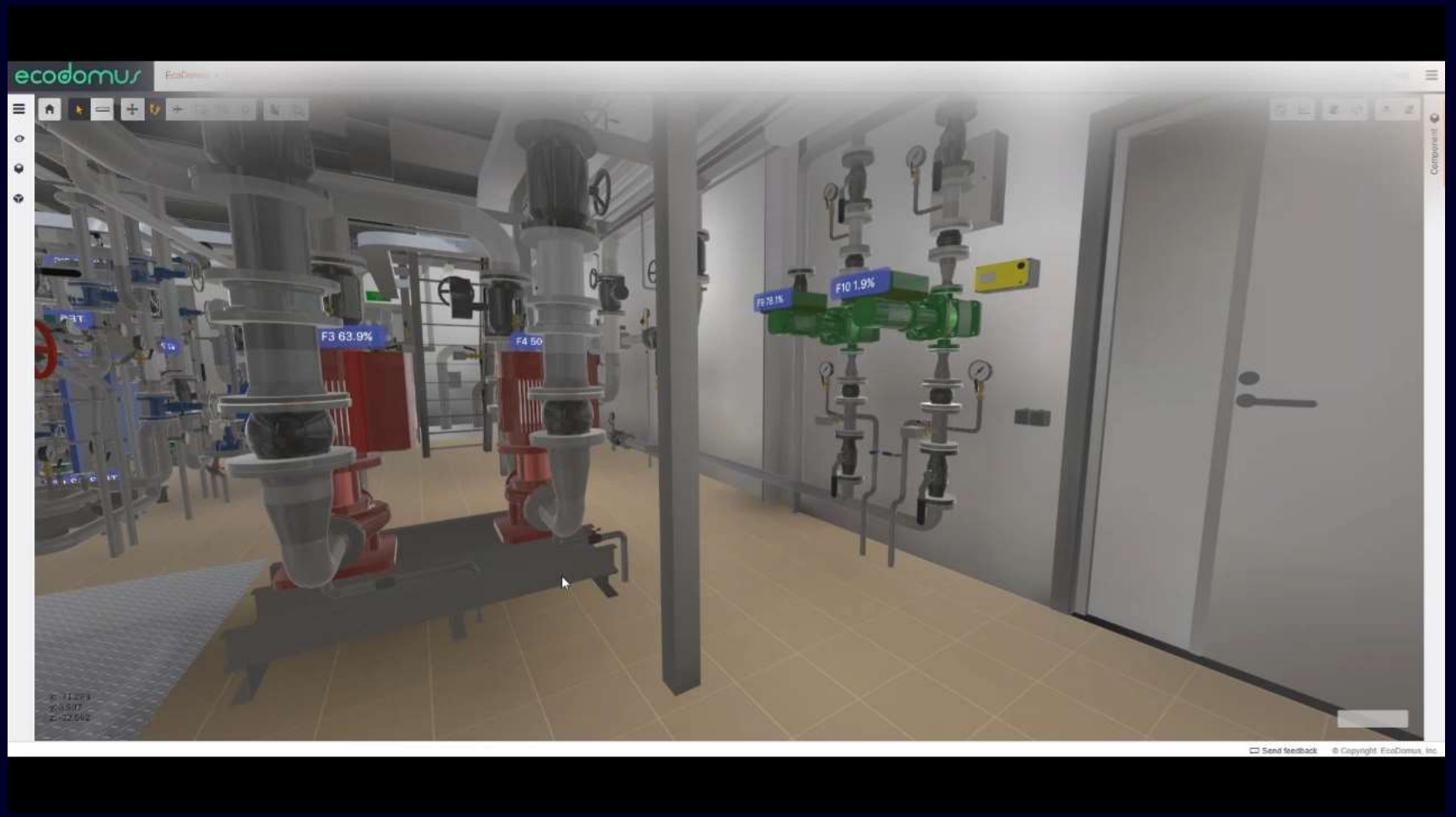
Use case: Alarm detection and resolution (Preventive Maintenance)



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Use Case: Data Center & Real Time Data Integration

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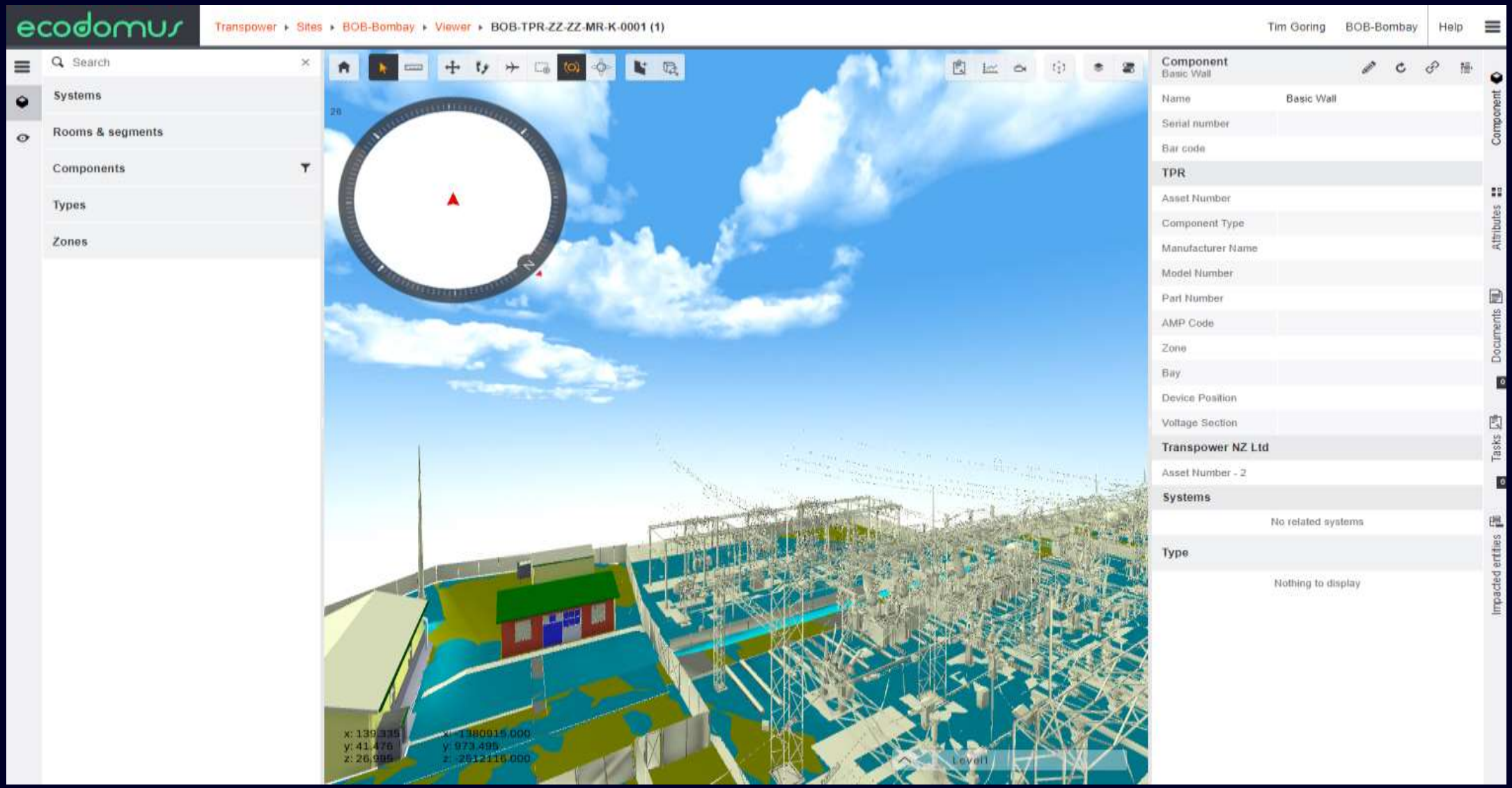
Use Case: Asset Inventory for condition monitoring



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Real Time Location Services

Quickly locate the nearest available equipment; save staff time and improve response times

Analyze how a specific asset is utilized; avoid over-provisioning and ensure assets are effectively deployed

Use location services data to **optimize workflows processes** and improve outcomes

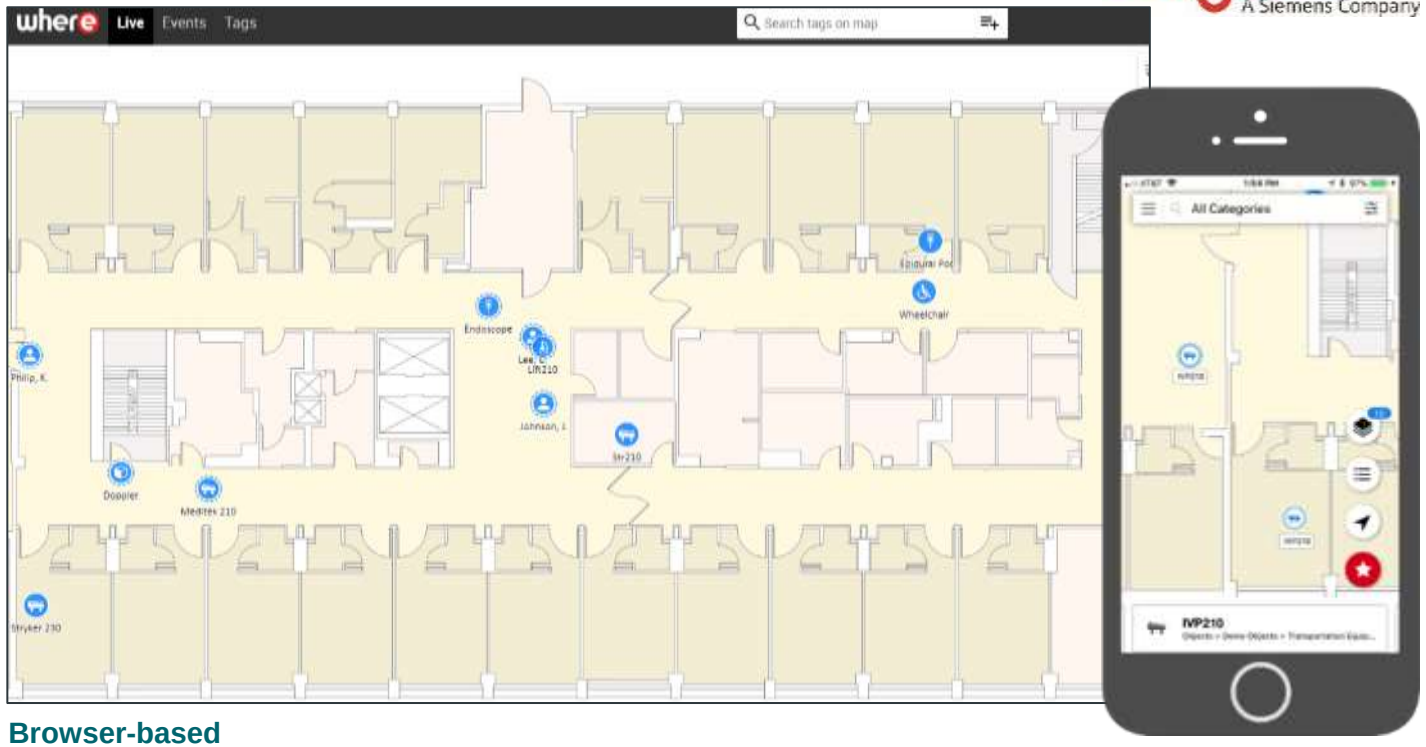
Help students, staff and visitors **quickly find a destination** using a Bluetooth equipped mobile device

Locate equipment, staff and visitors; in the event of a fire, ensure everyone safely evacuates

Prevent asset loss by receiving an alert when an asset leaves a designated area

Real-time Live Motion Views On Map

enlighted A Siemens Company



Browser-based Application

Mobile App (iOS and Android)

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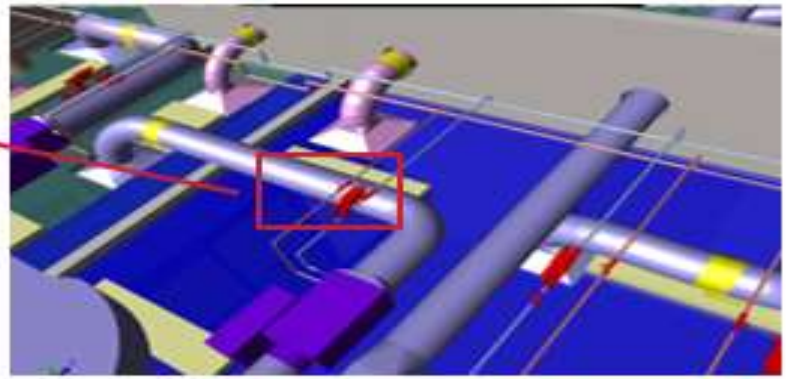
Use Case: Smart Hospital - Shutdown Planning



Major Plumbing Leak

Planned Electrical Shutdown

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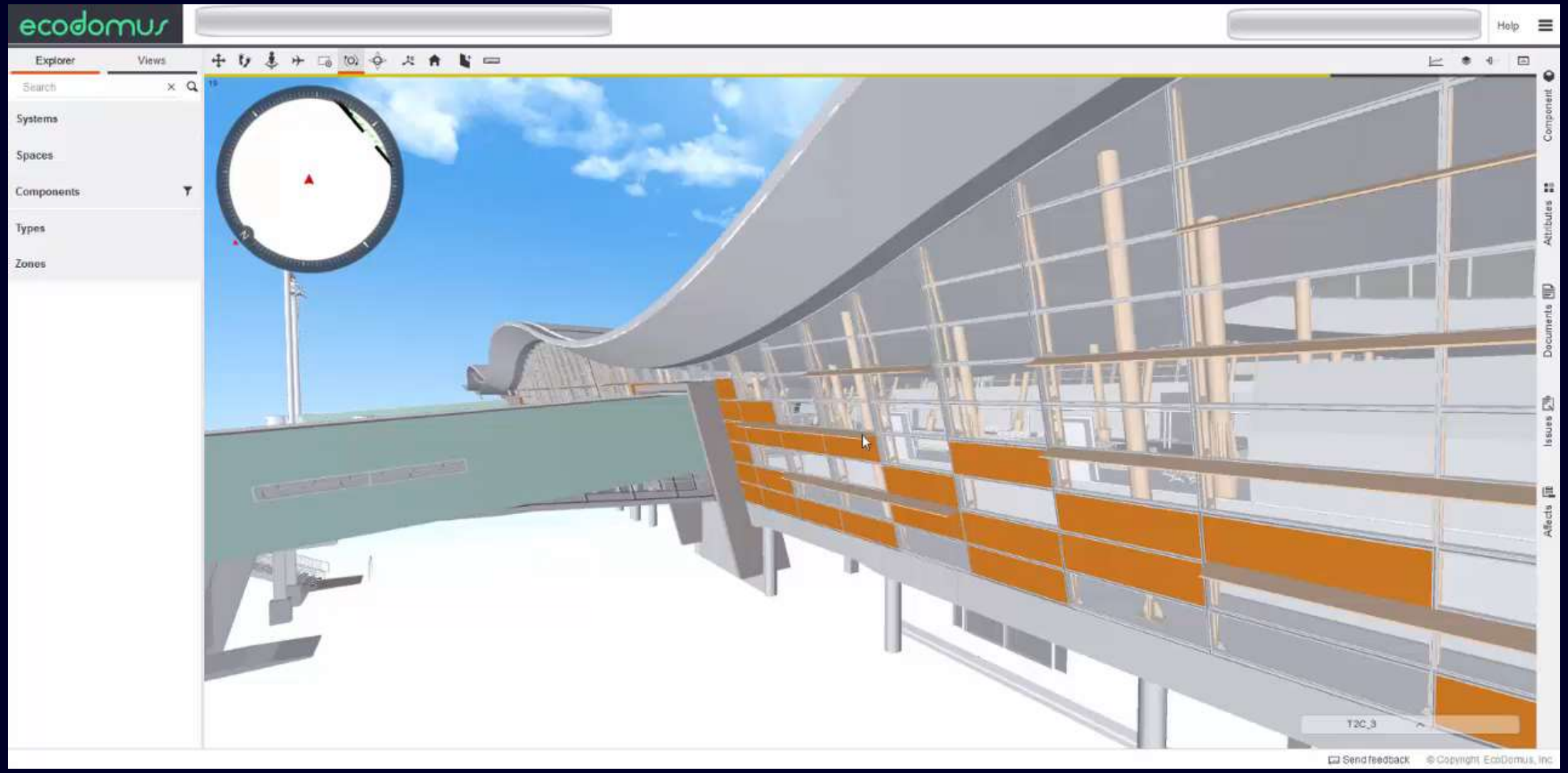
Use Case: Driving Transportation Infrastructure



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Fuel Farm Inspection - Airport

- Risks if not inspected:
  - Fire
  - Safety Issue
  - Contamination
  - Regulatory Issue
  - Thermal Radiation

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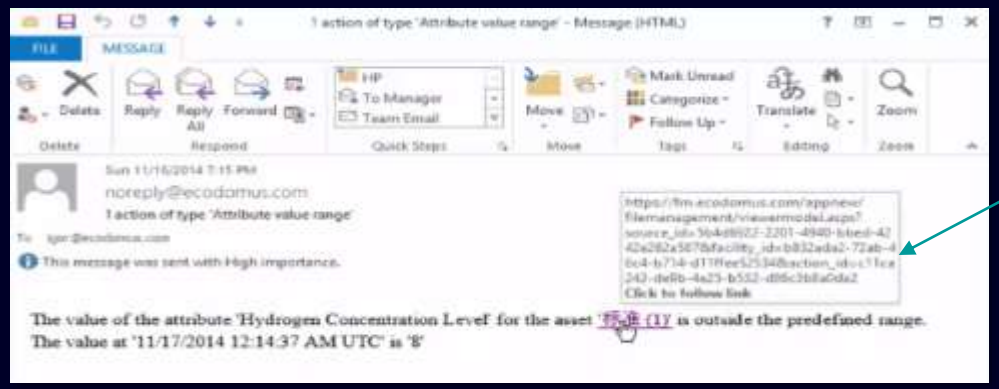
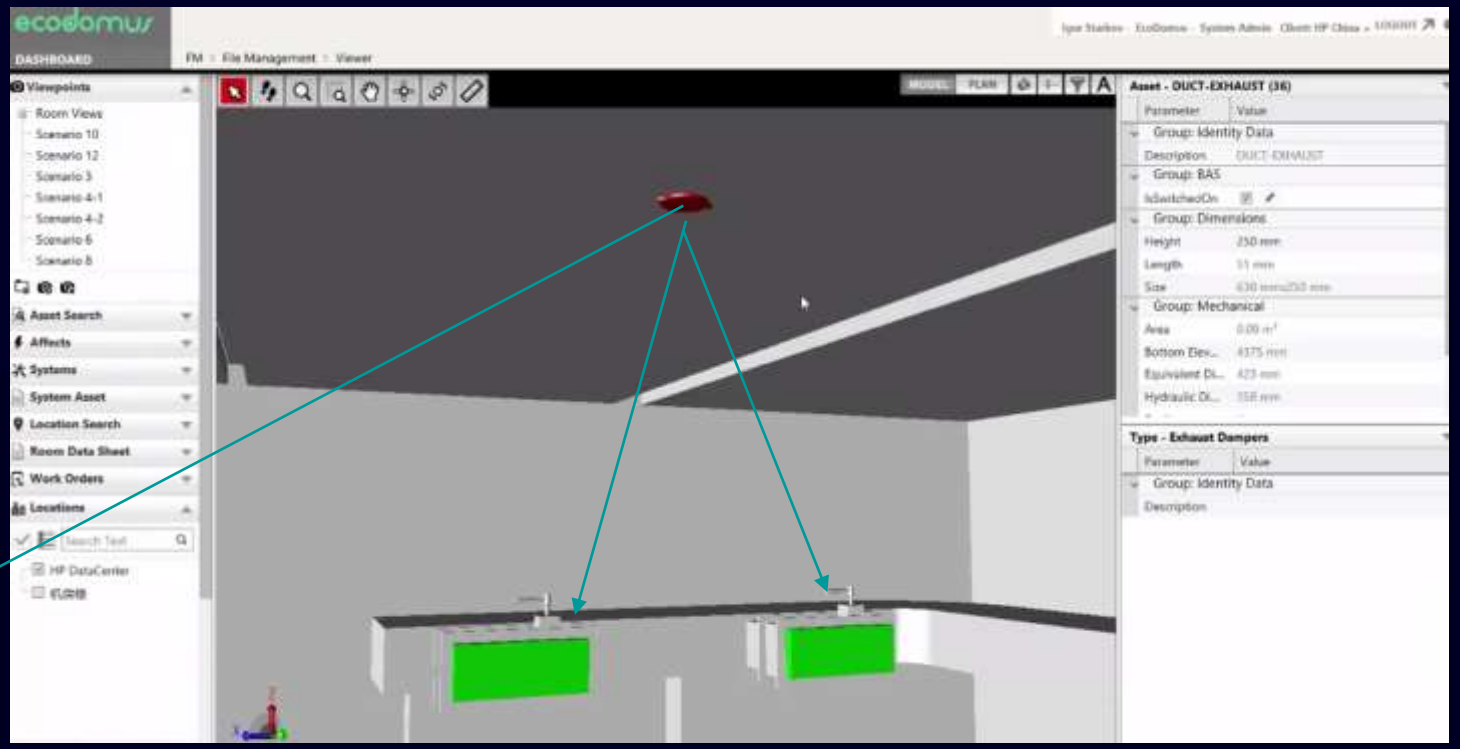
Utilization of FM tools during Operational Phase

News report: "*More than 3,000 people were evacuated from Moscow Domodedovo Airport after a small fire erupted in the baggage sector and covered an area of about 15 square meters. The smoke got into the ventilation system and airport facility managers did not react quickly to prevent the spread of smoke into the main terminal. More than 50 flights have been delayed from the international airport, the second largest in Moscow and Russia.*"

The issue could've been solved by EcoDomus like demonstrated below: a sensor on the ceiling identifies the smoke and sends a notification email with the link to EcoDomus BIM that shows the dampers that need to be closed immediately.





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End-to-end with Building X Lifecycle Twin

- Scanning & BIM Model Integration
- Asset Information
- Document Management
- Tasks (Variations, Defects)
- Digital Forms (ITPs) and app

Project Information

Handover

- Asset Information Model
  - Asset/Space Register
  - As-Builts (BIM/CAD)
  - O&Ms

- Maintenance Mgmt.
- Sensor readings & Alarms
- Simulations and Animations

Digital Twin

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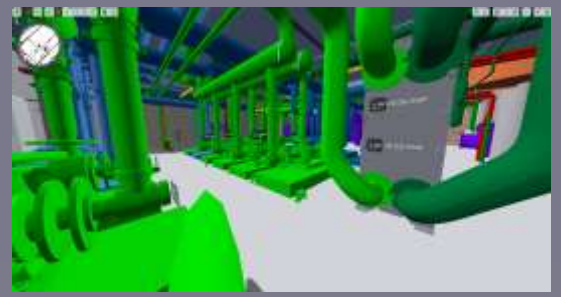
Case Study



Melbourne Connect Precinct

- 42-year PPP in Melbourne Australia
- $500 Million AUD Greenfield construction
- Innovation hub of Melbourne (Fabrication Lab, Digital Twin Lab, Gallery)

Scope

- Remote monitoring
- Single Pane of Glass
- BIM Mgmt.
- Integrates into Schneider BMS, Aconex, WMS

Using BIM in operations to drive **TCO** down

Single pane of glass

First certification of ISO 19650:3 in Asia Pacific (operational BIM)

Most **advanced** level of BIM Modelling

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Case Study

Royal Children's Hospital Melbourne

- 340 beds
- Built 2011 - $1.5 Billion Project
- 200,000 Sq Meters

Scope

- Schneider - BMS
- WMS - CMMS
- SPM Assets - Lifecycle
- Zutec - EDM

Using Digital Twin in operations to drive **TCO** down

Single pane of glass

Brownfield CAD to BIM

Full **visibility** of operations to client

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Case Study

Veolia

- Brownfield wastewater sludge Incineration and Power generation plant in Hong Kong
- Laser scan and Retro-BIM modelling process with asset tagging
- Remote monitoring
- Central management from Europe

Remote Site Inspection

Single pane of glass

Brownfield SCAN to BIM

Full **visibility** of operations to client

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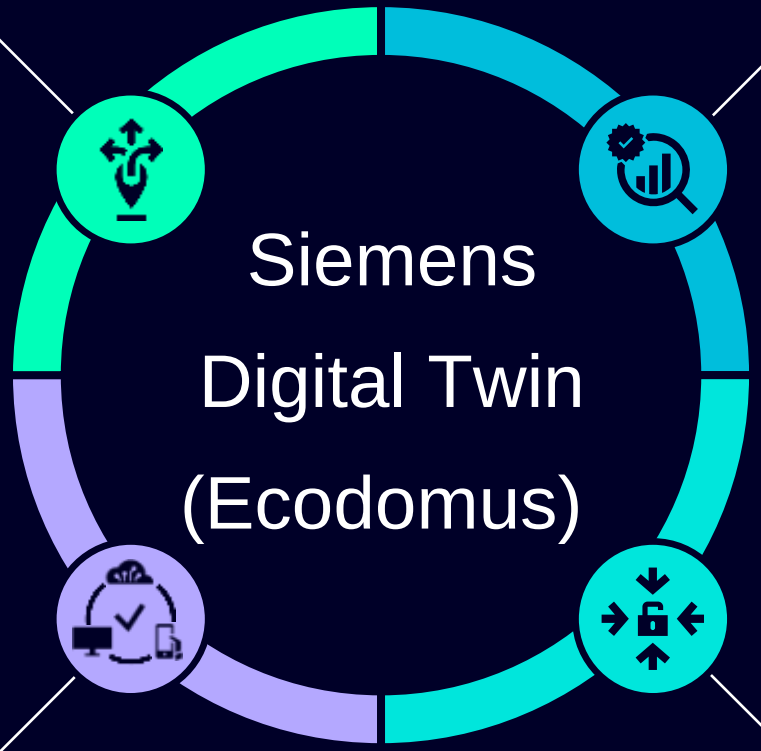
Why all roads lead to Digital Twin?

Single source of truth

Better data quality



Flexible and scalable solution

No Vendor lock-in

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Let’s Connect

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