## Overview

**Facility Digitization Accelerator** is designed to unlock facility-related operational and sustainability data at scale.

## Problem Statement

Facilities contain numerous disparate, unnormalized Operational Technology systems (HVAC, lighting, power, etc.) often controlled by a [Building Management System](https://en.wikipedia.org/wiki/Building_management_system) (BMS). Data from these systems is critical for operations, sustainability calculations, reporting, and optimization. Onboarding these systems into an IoT cloud solution is an arduous, manual, serialized task taking domain experts 1-3 months to classify and normalize the data (ex: it would take 100+ years for 2,000 buildings, the portfolio size of one of our customers).

## Our Solution

We are providing a provisioning tool which converts raw data from the BMS into a well-defined digital twin topology of the building using [RealEstateCore](https://github.com/Azure/opendigitaltwins-building), an open industry standard data model. By leveraging this tool, customers can now onboard their building and realize business value in 3-5 days or less.

## End-to-end data flow

We are working with [Mapped](https://www.mapped.com/) as the source provider for BMS discovery, deduplication, and normalization. Any Digital Twins Solution Provider, which implementation is based on Azure Digital Twins, could be the target consumer of the source data. At a high level, this is the data flow:

Diagram, schematic

Description automatically generated

We have significantly simplified the end-to-end data flow to digitize a facility:

1. Deploy the Mapped container on an Azure Stack Edge box or other capable hardware
2. Mapped runs discovery and classification of BMS instances
3. The Facility Digitization Accelerator uses the output of Mapped’s classification to provision an Azure Digital Twins instance within the Digital Twins Solution
4. Digital Twins Solution is enriched with telemetry messages from the edge gateway
5. Telemetry and instances are exported to Azure Data Explorer to make it operational at scale for reporting and analysis
6. Energy-related data from the accelerator can be connected with Microsoft Sustainability Manager (MSM) for facility emission reporting (Coming Soon). Our partners will be able to take advantage of this e2e flow to easily connect sustainability data with MSM. Stay tuned for more on this!

## Capabilities

This preview provides the following capabilities

* Automatic discovery of BMS data via [BACnet](https://en.wikipedia.org/wiki/BACnet) protocol
* BMS classification, deduplication, and Machine Learning-based normalization of the equipment, devices, sensors, spaces, etc. into an industry-standard data model.
* Target modeling is flexible beyond RealEstateCore models. The [OntologyMapper](https://github.com/Azure/opendigitaltwins-tools/tree/main/SmartPlaces.Facilities/lib/OntologyMapper) library allows developers to define conversion processes from one DTDL-based modeling (Mapped) to a different DTDL-based modeling
* The building topology is loaded into an Azure Digital Twins graph leveraging RealEstateCore modeling.
* Live topology is updated in case there are changes on the network, on a configurable basis (currently every 12 hours)
* An Application Insights-based Azure dashboard with logs and metrics displaying: # of buildings onboarded, # of twins ingested, # of relationships ingested, # created twins failed, etc.

## Metrics & Visualization

We have been running the preview on Microsoft Building 122 and here are the metrics and visuals:

* 5 days discovery and ML-normalization, < 1h to upload to Azure Digital Twins
* 137,930 twins discovered, normalized, and cloud connected
* 5m+ telemetry messaged received and processed daily
* 95% of classified twins have 0.85 confidence or above

## A screenshot of a video game Description automatically generated with medium confidenceGraphical user interface, table Description automatically generated