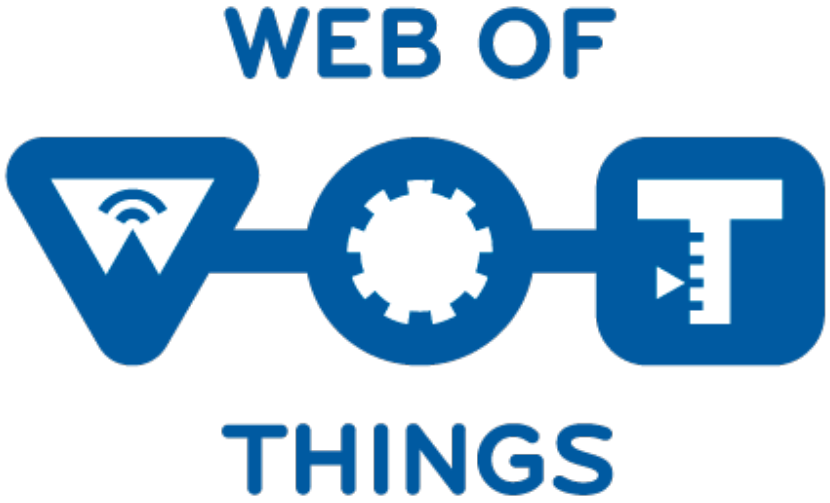


Smart City PoC Projects

Michael McCool, Intel

Jennifer Lin, GovTech Singapore

Smart City Use Cases: GovTech Singapore

Person Density/Fever Mapping

- Use of AI and thermal cameras for health monitoring; pandemic management

City Dashboard

- Collection and visualization of data to support decision making

Transportation

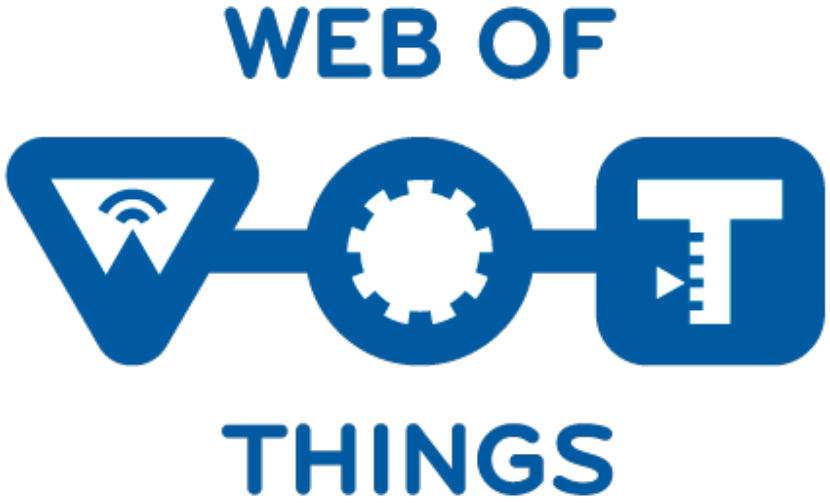
- Fleet management, mapping, routing; both logistics (deliveries) and people

Robotics

- Security patrols, parks, sensor placement, mapping, coordinated land and air swarms

Geolocation

- Component of most of the other use cases; both static and dynamic (portable)

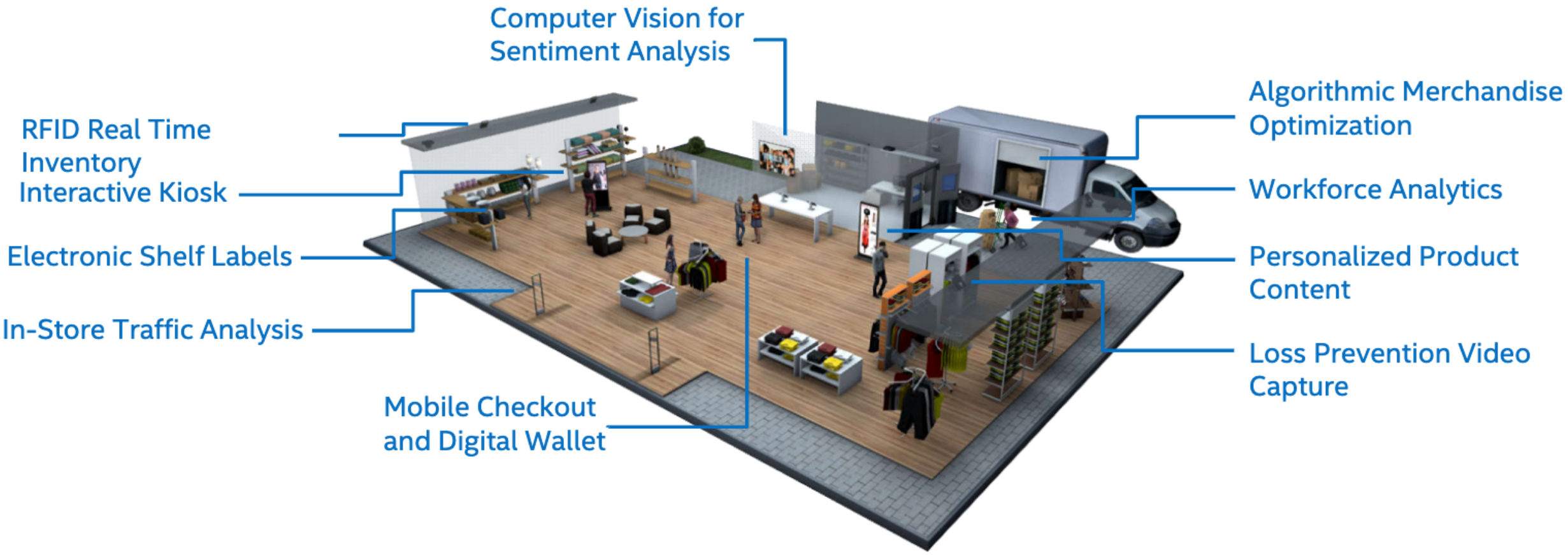


Retail PoC Projects

Michael McCool, Intel

David Ezell, Conexxus

Retail Use Cases



Retail PoC Collaboration

- Intel's Open Retail Initiative (ORI)
- EdgeX Foundry
- Conexxus
- W3C Web of Things

Buying an Ice Cream

Camera captures image and sensor detects freezer door opening

Camera

Freezer Door Sensor

Data analytics identifies person and product

Person identification

Person tracking

Product identification

Alert based on location and behavior

To counter:

Associate facing alert: Customer waiting

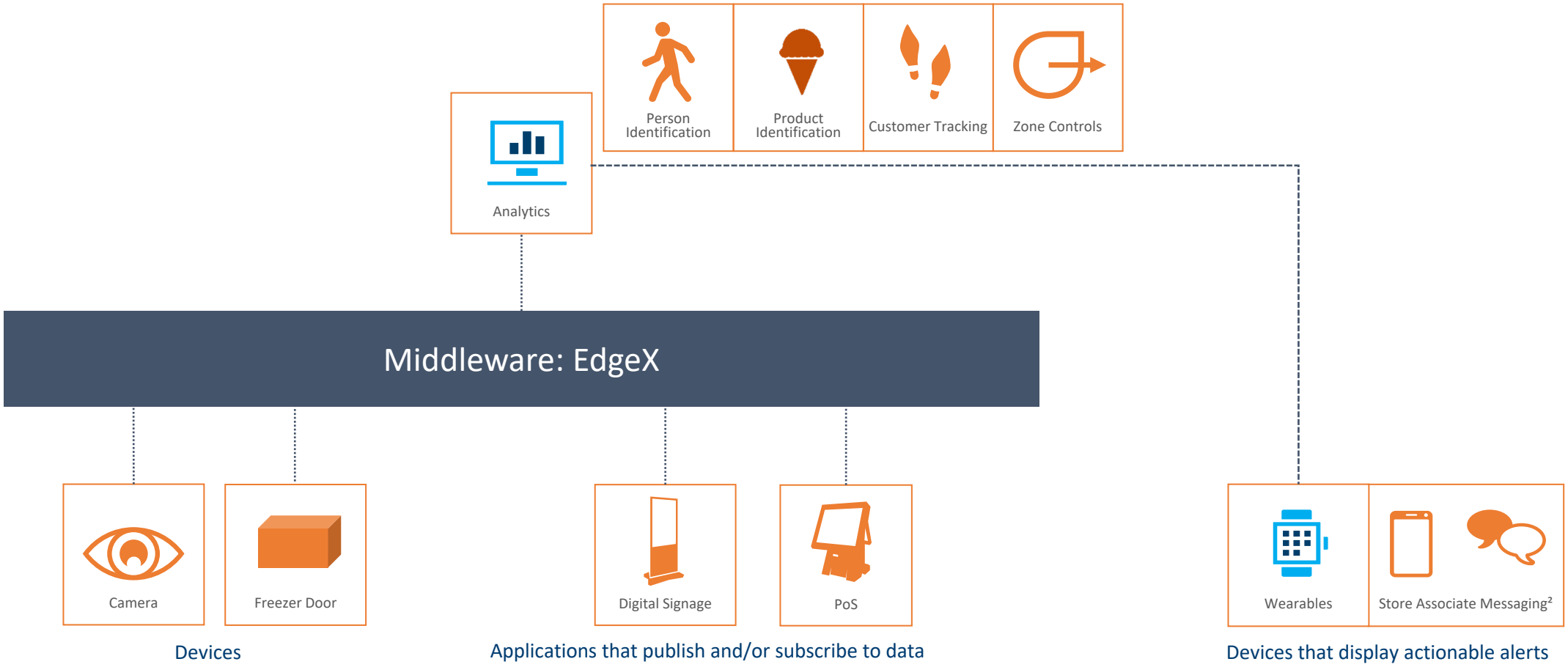
Customer facing alert: Price display

To door:

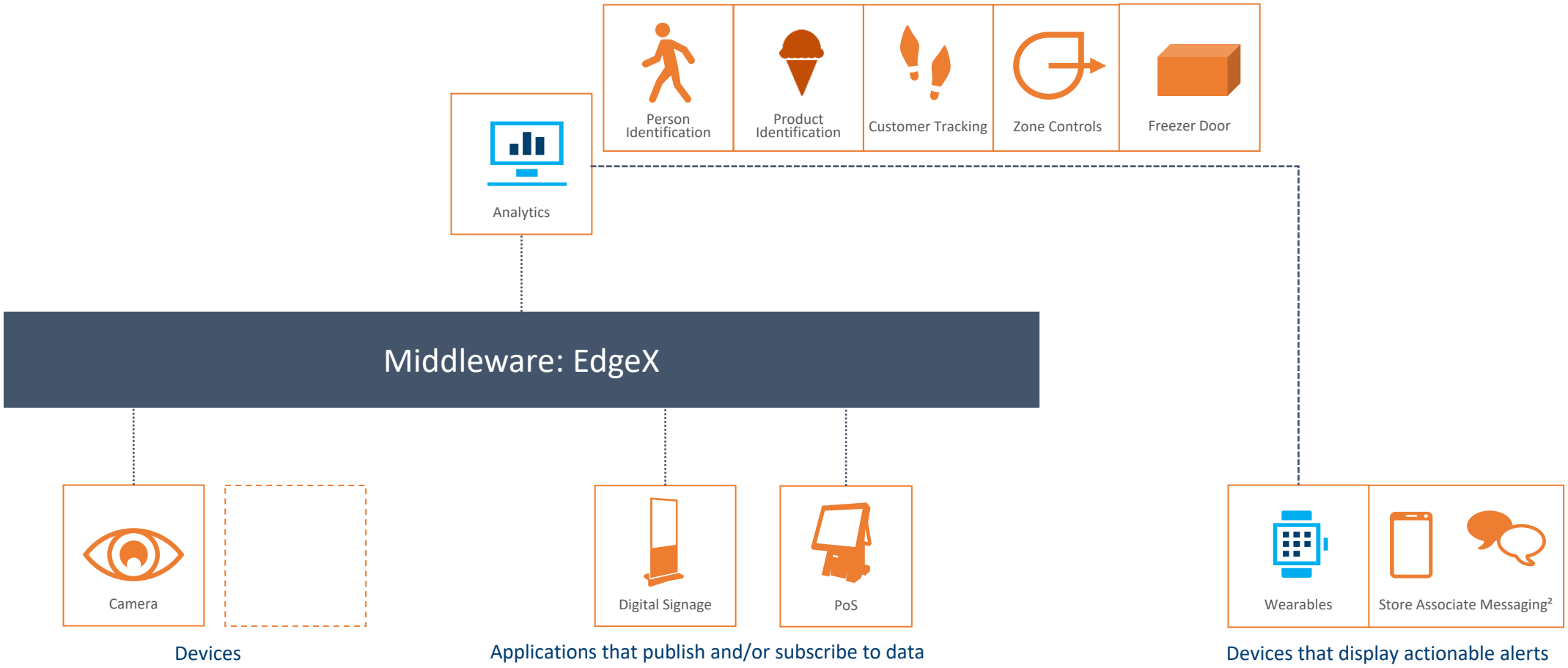
Associate facing alert: Zone violation

Customer facing alert: Door “reminder” display

High Level Diagram of Implementation



Adaptation: Replace Real with Virtual Device



Showcase Need for End-User Programming

Adaptation to Available Devices

- In order to consolidate services, devices need to be shared
- Services developed in a “siloed” fashion assuming exclusive access to devices cannot be consolidated
- Services may have to adapt to (or be adapted to) substitute devices

Rapid/Easy Development

- Adapting services to a given environment may require some “end-user programming”
- This should be as simple as possible
- Tools should support device and service connection, substitution, and sharing

EDGE X FOUNDRY™

Platform Architecture

WEB OF THINGS

"NORTHBOUND" INFRASTRUCTURE AND APPLICATIONS

LOOSELY-COUPLED MICROSERVICES FRAMEWORK

CONTAINER DEPLOYMENT

REMOTE/LOCAL GUI

CHOICE OF PROTOCOL

REVERSE PROXY

EXPORTING AND

WoT Scripts/Node-RED

ADDITIONAL SERVICES

APPLICATION SERVICE

SDK

ADDITIONAL SERVICES

MANAGEMENT

SECURITY

ADDITIONAL SECURITY SERVICES

SUPPORTING SERVICES

RULES ENGINE

SCHEDULING

ALERTS & NOTIFICATIONS

LOGGING

ADDITIONAL SERVICES

ALL MICROSERVICES INTERCOMMUNICATE VIA APIs

CORE SERVICES

WoT TDs

CORE DATA

COMMAND

METADATA

REGISTRY & CONFIG

MGMT SERVICE AGENT

DEVICE SERVICES (ANY COMBINATION OF STANDARD OR PROPRIETARY PROTOCOLS VIA SDK)

SECRET STORE

REST

OPC-UA

MODBUS

BACNET

ZIGBEE

BLE

MQTT

SNMP

VIRTUAL

ADD'L DEVICE SERVICES

SDK

"SOUTHBOUND" DEVICES, SENSORS AND ACTUATORS

Planned WoT/EdgeX Integration

1. Generate WoT Thing Description metadata for all EdgeX Device services
   - Including semantic tagging using One Data Model
2. Generate WoT Thing Description metadata for select EdgeX Analytics services
   - Computer vision services
3. Prototype a Thing Directory service supporting semantic search
   - To run in parallel with existing EdgeX metadata service
   - Existing EdgeX discovery process would act as “Introduction” layer – WoT Discovery prototype
4. Support Rapid Orchestration Development
   - Using WoT Scripting API and node-wot
   - Using node-gen to generate Node-RED modules
5. Stand up Retail use case examples that integrate IoT and Analytics:
   - Loss detection video analytics triggered by an IoT door sensor
   - Digital shelf signage/RFID and weight-based inventory control/item identification
   - Customized marketing content based on video analytics