SICK
Sensor Intelligence.

Empowering Industrial Automation with WoT

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Business Cluster Integrated Automation
SICK AG

Agenda

1. Introduction to SICK „Sensor Intelligence.“
2. The Challenge
3. Creating Digital Twins
4. Applications for Digital Twins
5. Summary and Discussion

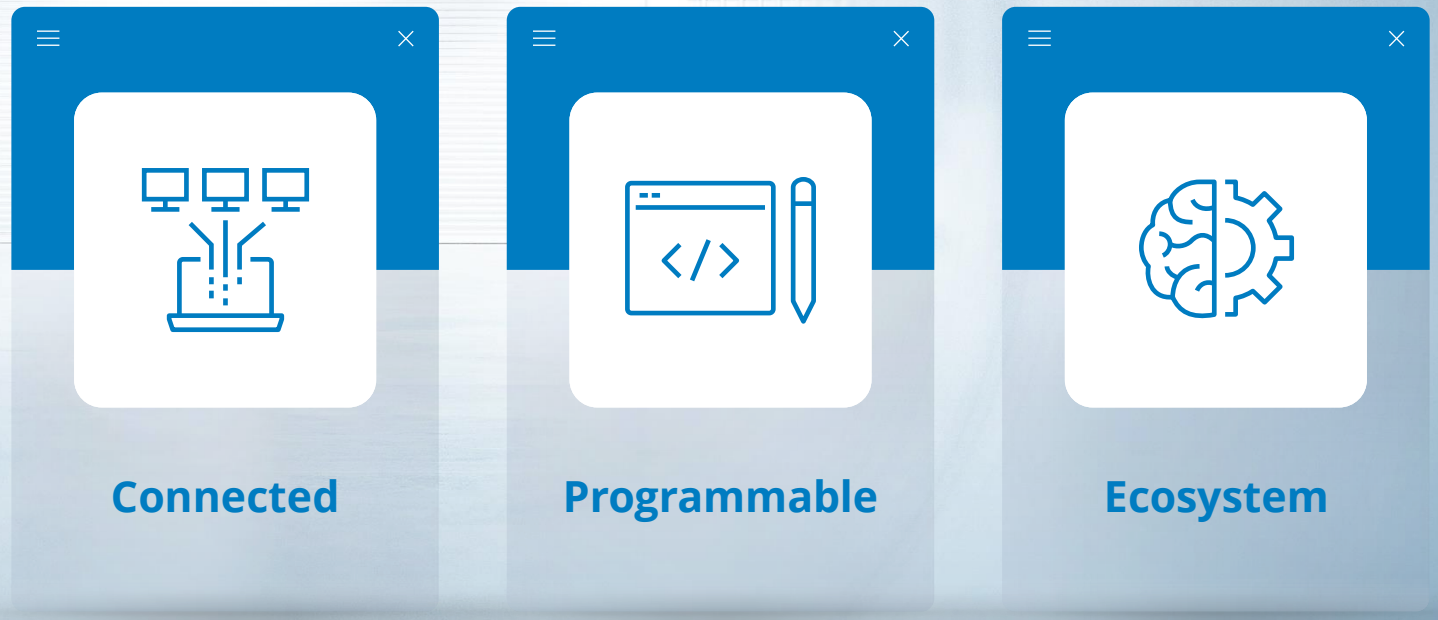
USING “SENSOR INTELLIGENCE.” IN A SMART WAY

AS A CUSTOMER, OUR SOLUTIONS ARE OPEN TO YOU AND TO YOUR SYSTEMS

Detecting | Identifying | Measuring | Protecting | Integrating | Controlling

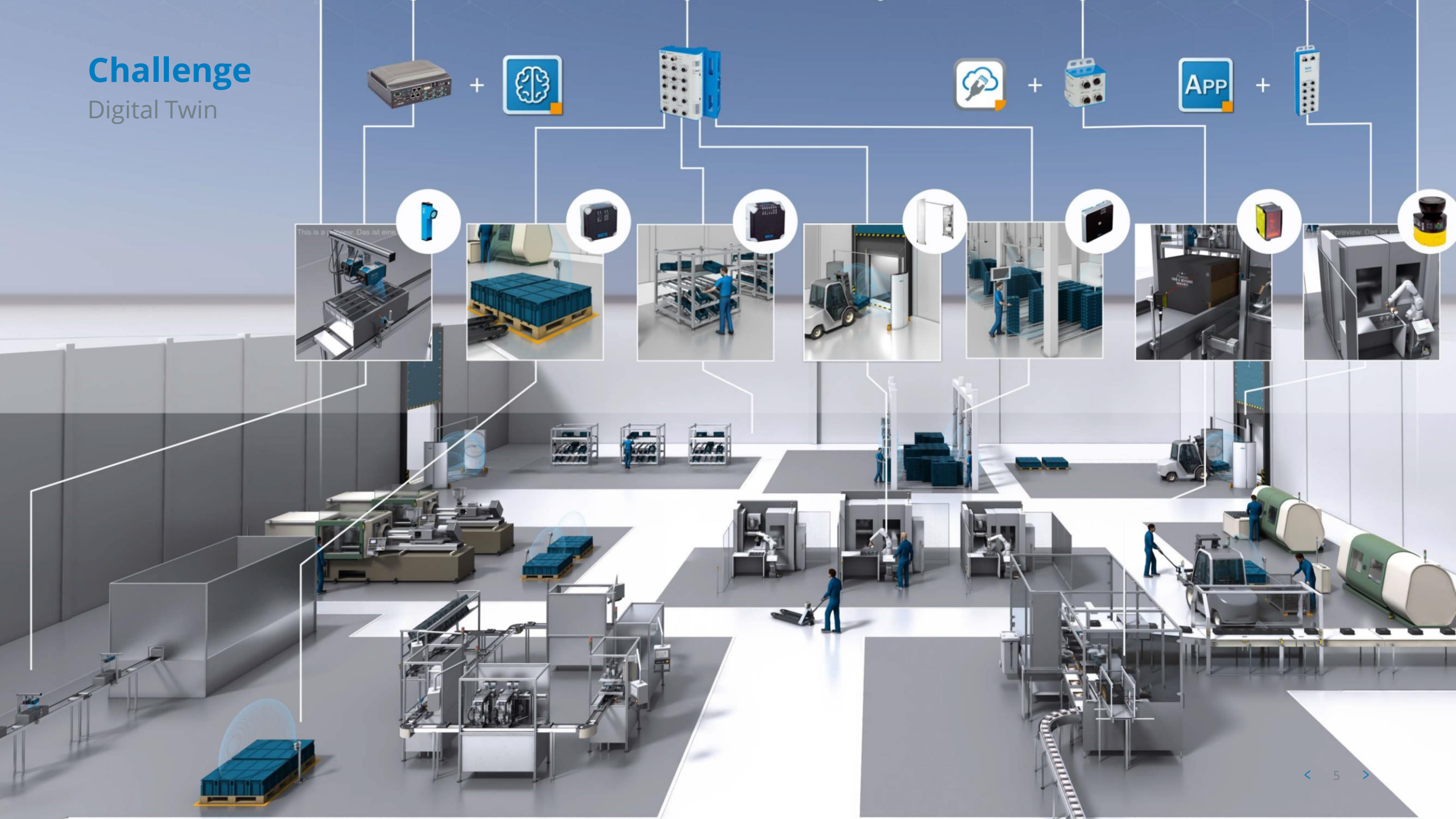
CREATING “SENSOR INTELLIGENCE.”

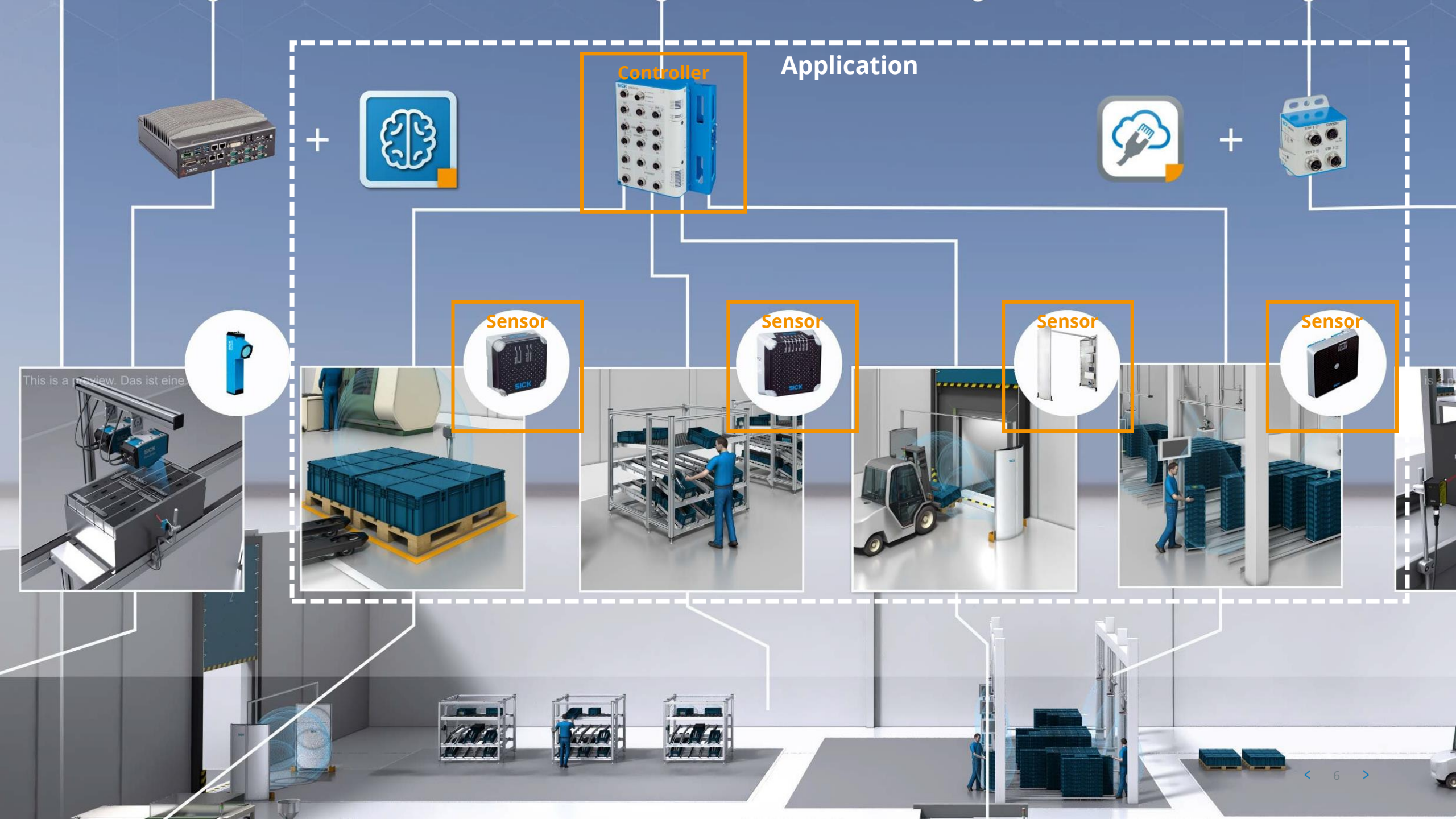
TURNING DATA
INTO INFORMATION



Challenge

Digital Twin




Application
Controller
Sensor
Sensor
Sensor
Sensor

Thing Model

Contract First

SICK
Sensor Intelligence.

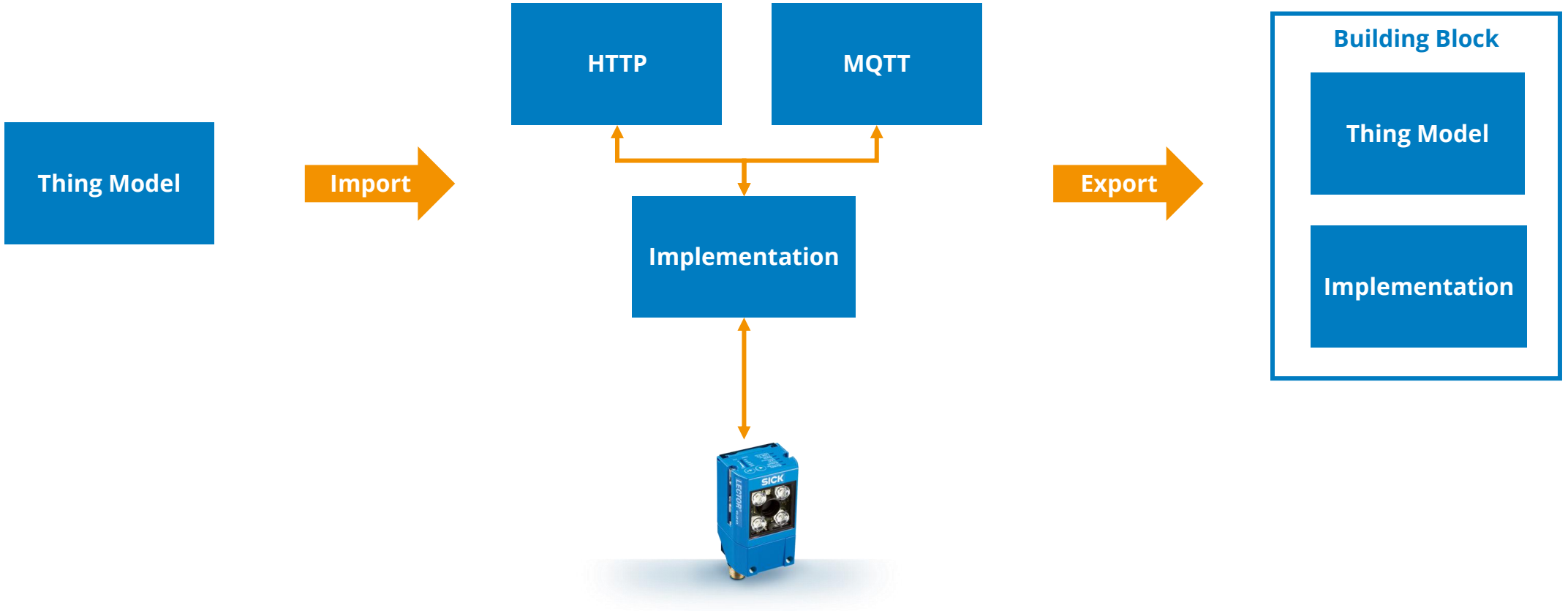
edi{TD}or

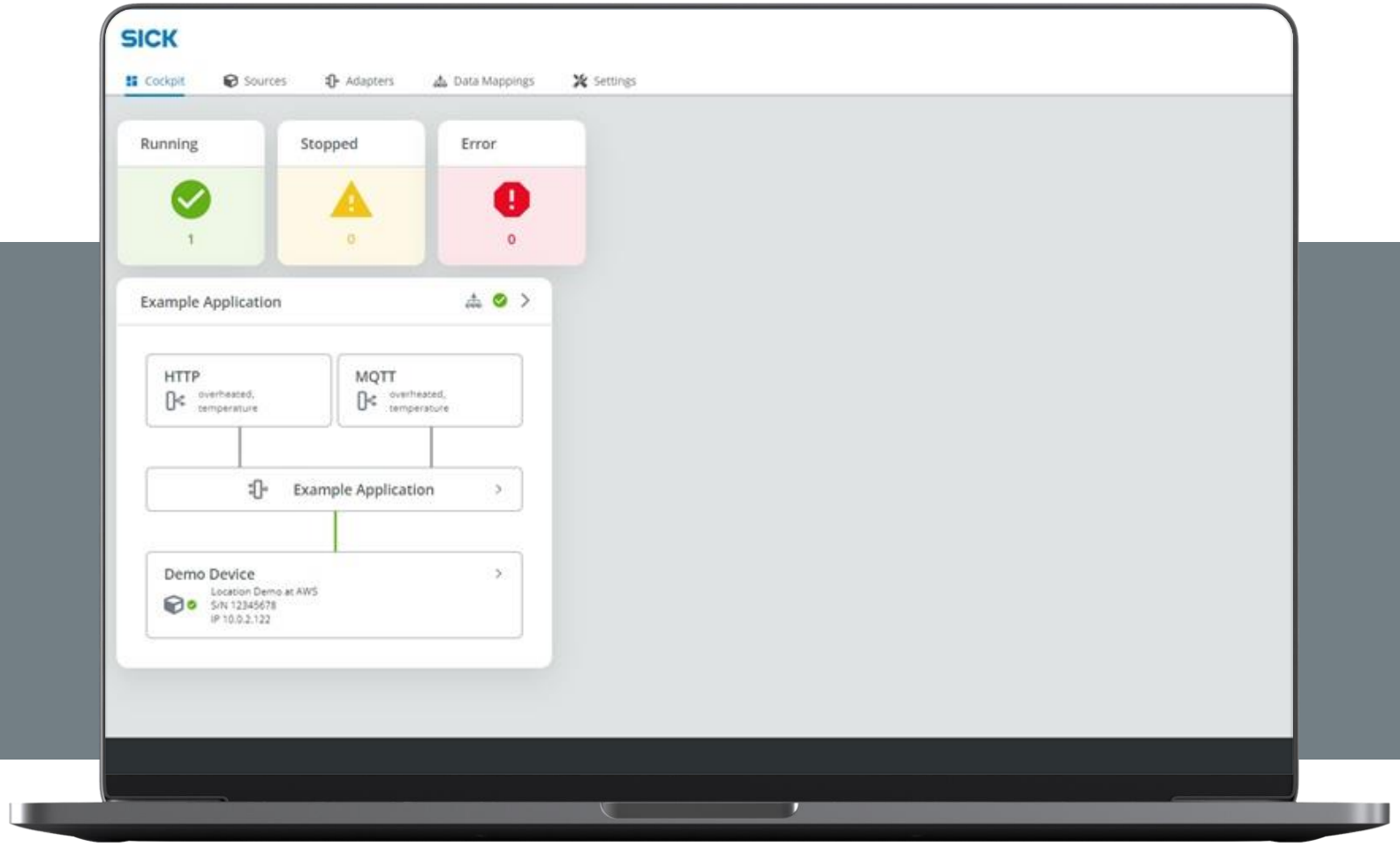
- The Thing Models contain
  - Interaction Affordances
  - Data Schemas
  - Title
  - Description
  - Version
- Stored in a database for linking and evolving the Thing Model


```
{
    "@context": "https://www.w3.org/2022/wot/td/v1.1",
    "title": "Example Application",
    "@type": "tm:ThingModel",
    "id": "urn:example-application",
    "description": "This is example application.",
    "version": {
        "model": "1.0.0"
    },
    "securityDefinitions": {
        "nosec_sc": {
            "scheme": "nosec"
        }
    },
    "security": "nosec_sc",
    "properties": {
        "overheated": {
            "title": "overheated",
            "observable": true,
            "readOnly": true,
            "description": "Represents the status if the sensor is overheated or not.",
            "type": "boolean"
        },
        "temperature": {
            "title": "temperature",
            "observable": true,
            "readOnly": true,
            "description": "The temperature of a sensor.",
            "type": "number"
        }
    },
    "actions": {},
    "events": {}
}
```

Building Block

Creating a Building Block from a Thing Model





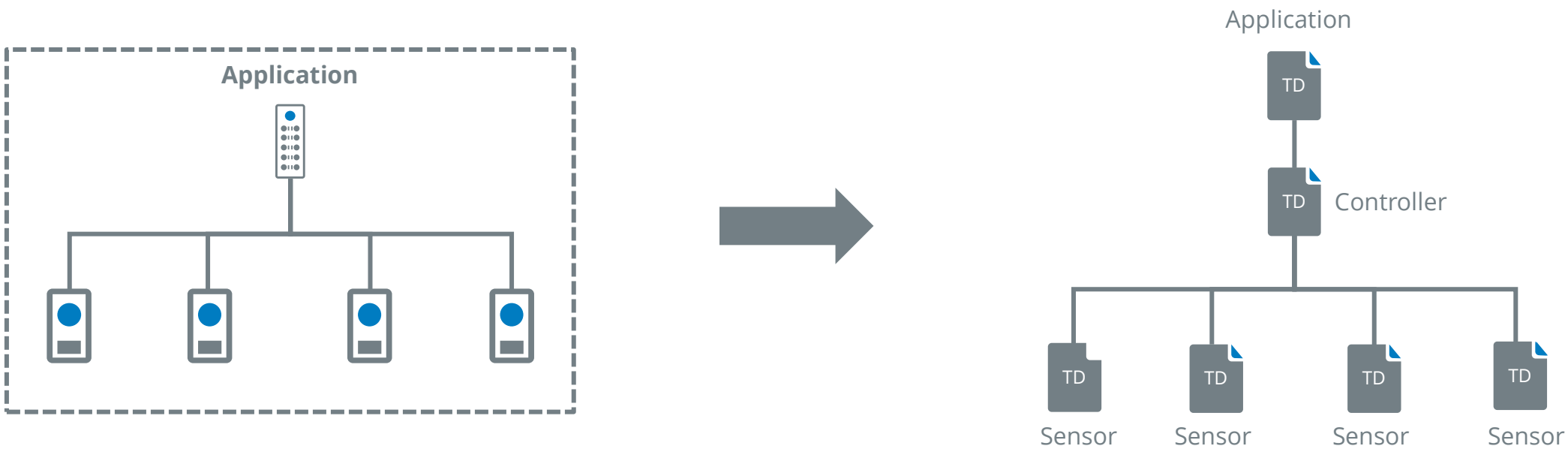
SICK ConnectX

Bridging Shopfloor and IT

- The communication base for SICK and customer data applications
- Interconnecting IT and OT world
- Support standard protocols in the IT world e.g. HTTP, MQTT
- Supports standard and proprietary protocols in the OT world e.g. IOL-JSON

Thing Descriptions

Building Blocks and configuration allow us to generate Thing Descriptions



Thing Description

Building Blocks and configuration allow us to generate Thing Descriptions

Links represent the relations between the application, controller and sensors using collection and item as relation type

```
"links": [
  {
    "href": "https://tdd.local/things/urn:id:example-application:sensor",
    "rel": "item",
    "type": "application/td+json"
  }
]
```

Security Definition

```
"securityDefinitions": {
  "bearer": {
    "scheme": "bearer",
    "in": "header",
    "authorization": "https://keycloak.local/auth/realms/main",
    "format": "jwt"
  }
},
"security": "bearer",
```

Thing Description

Building Blocks and configuration allow us to generate Thing Descriptions

Semantic Annotations

- Versions
- Serial number
- Model
- Product number
- Product ID

```
"version": {
  "instance": "0.1.0",
  "schema:softwareVersion": "0.2.0"
},
"schema:serialNumber": "234059158",
"schema:model": "Laser scanner",
"schema:mpn": "65921737",
"schema:productID": "pid.sick.com/65921737/234059158",
```

Interaction affordances with the forms

```
"overheated": {
  "title": "overheated",
  "observable": true,
  "readOnly": true,
  "description": "Represents the status if the sensor is overheated or not.",
  "type": "boolean",
  "forms": [{
      "href": "https://thing.local/properties/temperature",
      "op": [
        "readproperty"
      ],
      "contentType": "application/json"
    }]
}
```

Challenges

Building Blocks and configuration allow us to generate Thing Descriptions

- Creating a suitable schema of the semantic annotations.

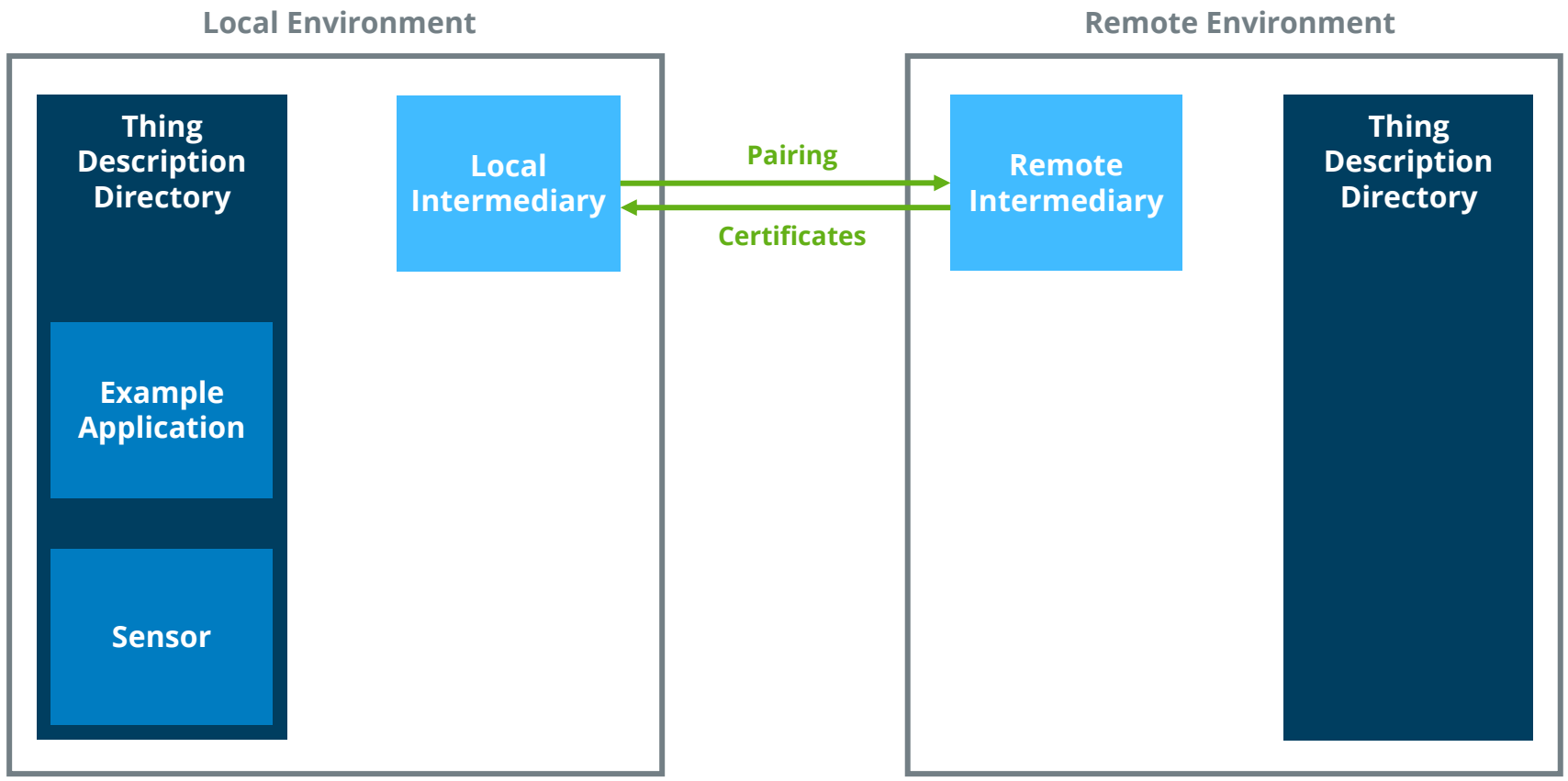
SICK LiveConnect

„Bring your sensor data to the cloud“

- **Create a virtual representation** (“digital twin” of your real device)
- **Pair your device** with the virtual representation
- **Manage routing and data forwarding** from the virtual device to other SICK Data Applications or to 3rd party dashboards, applications or systems

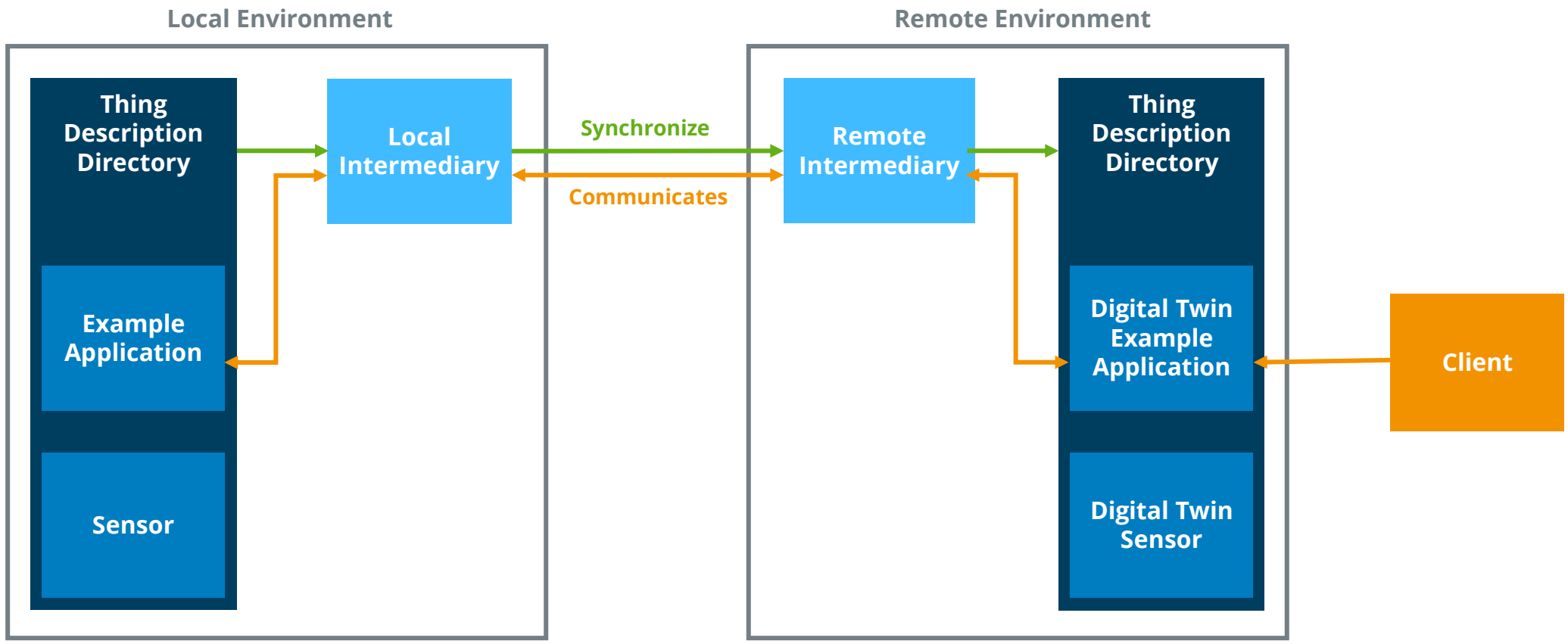
SICK LiveConnect

Bring your sensor data to the cloud



SICK LiveConnect

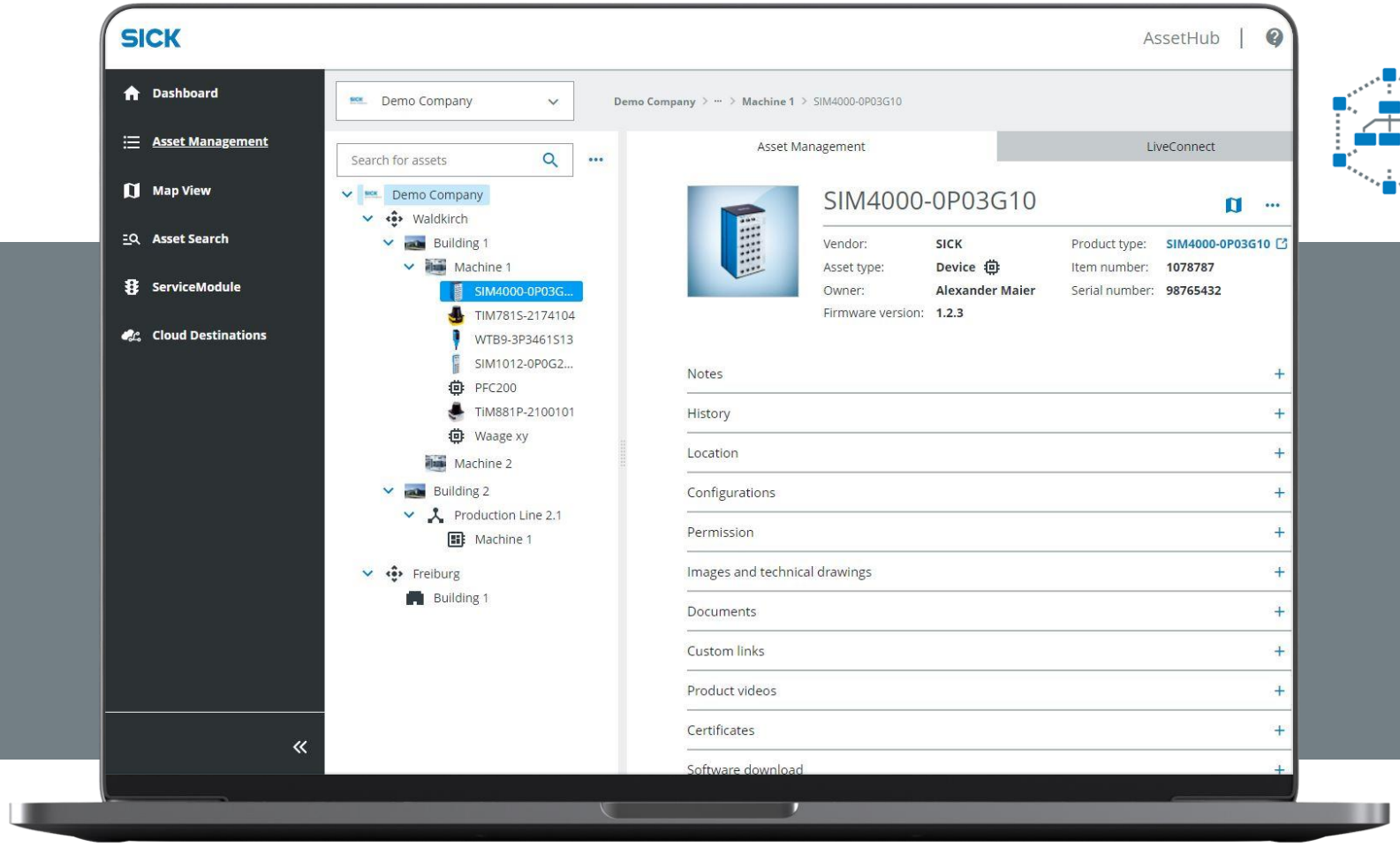
Bring your sensor data to the cloud



Challenges

Bring your sensor data to the cloud

- Defining a custom tunneling mechanism between the intermediaries.
- The remote Thing Descriptions Directory is a (readonly) restricted implementation excluding the functionality of editing, create new Thing Descriptions.
- In the remote environment we are stripping not supported protocols from the Thing Descriptions and translating them to supported ones. The tunneling mechanism is, with regards to the interaction affordances, protocol agnostic.



SICK AssetHub

„Manage your digital twins“

- Complete transparency over all your assets
- Any type of asset can be mapped with different structural elements
- Manage devices manufacturer-independently
- Access a wide range of product information
- History and traceability of digital interactions along the life cycle

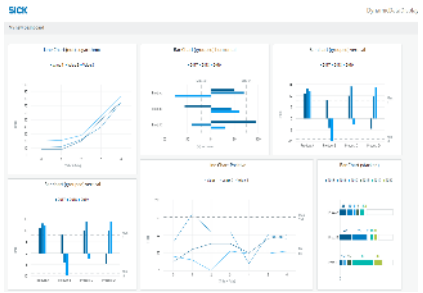
Application Examples

Communication Layer for OT, IT and Cloud Services

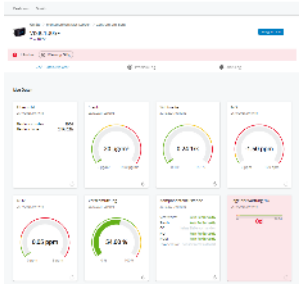
Applications

Data Aquisition / Data Dispatching

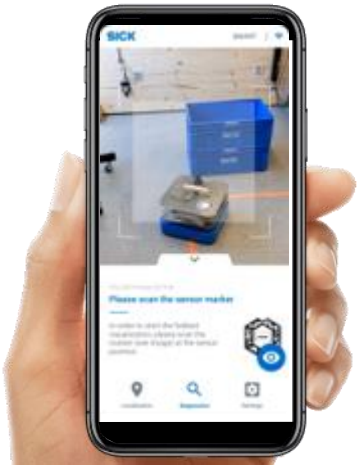
SD3



Monitoring Box

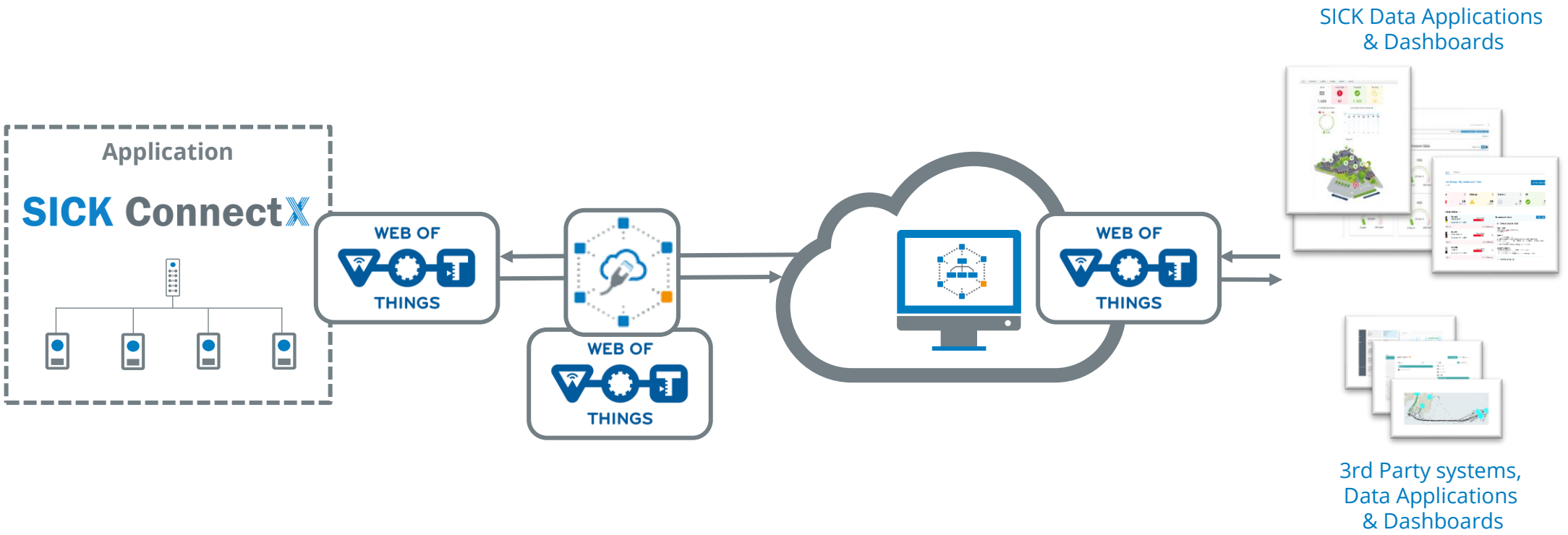


SICK Augmented Reality Assistant



Thing e.g. via SICK AssetHub / SICK ConnectX

Summary and Discussion



1 Create valuable information

2 Create Digital Twins

3 Manage Digital Twins

4 Consume information