OMG Standards at Work In The Industrial Internet Of Things, Reston, March 17th , 2016

From Testbed to International Standards – The Track & Trace Example

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Track & Trace Testbed

Testbed overview

Collaborators

Testbed Leads: Bosch, TechMahindra, Cisco + PTC ThingWorx

Market Segment

Industrial Manufacturing
Power Tool Fleet Management

Goal

Manage hand-held industrial tools in manufacturing, maintenance and industrial environments

Features & Commercial Benefits

High-precision indoor localization
Real-Time Mapping to 3D PLM data
Asset Management, Work Management
Monitor/Control Quality

Approach & Status

Phased Approach

Phase 1: Simple solution, fast GTM[1]
Phase 2: High-precision, advanced solution

Current Status

Approval by IIC STC in Dec 2014 as the first public IIC Testbed
Milestone 1: Live Demo at BCW15 ✓
Milestone 2: Initiate GTM Phase 1 ✓
Milestone 3: High precision localization ✓

[1] GTM – Go to market [2] Steering Committee

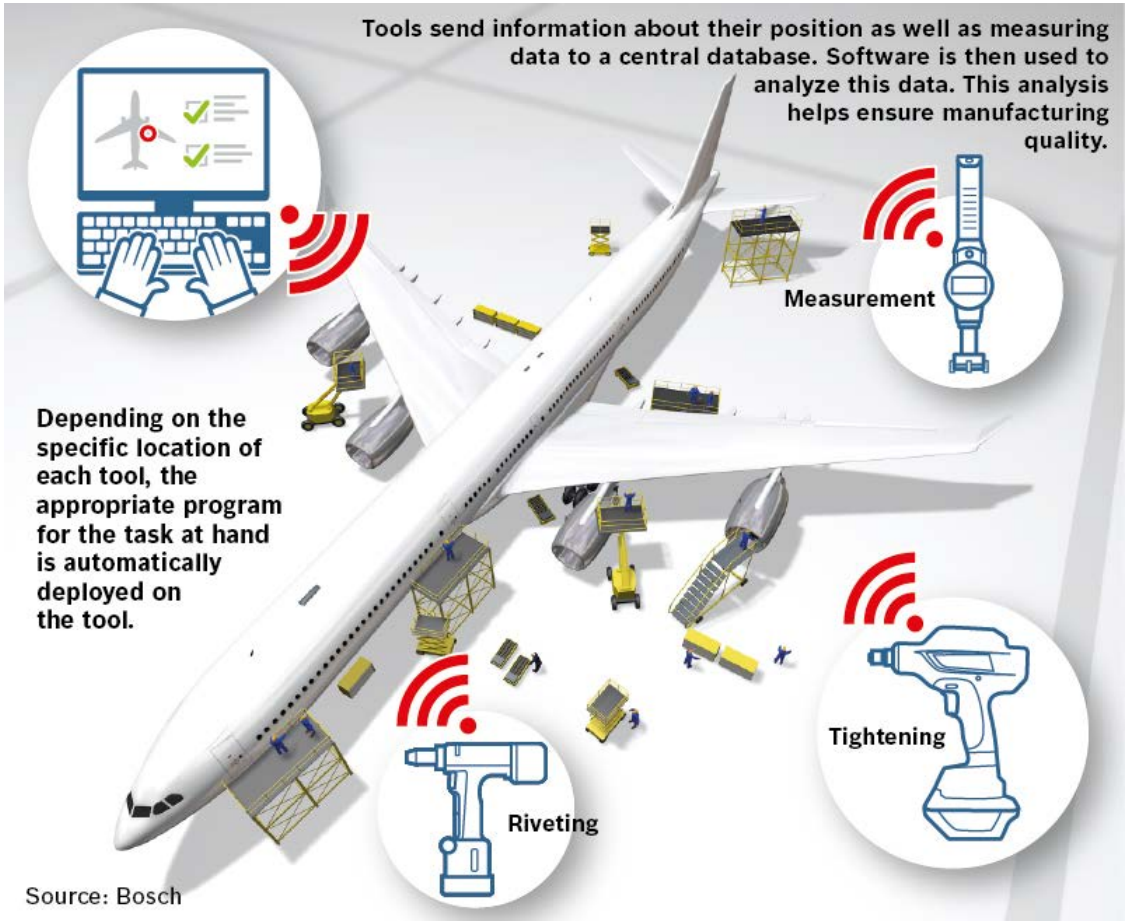
Power Tools in Assembly Lines

Example: Nexo Corless Wi-Fi nutrunner

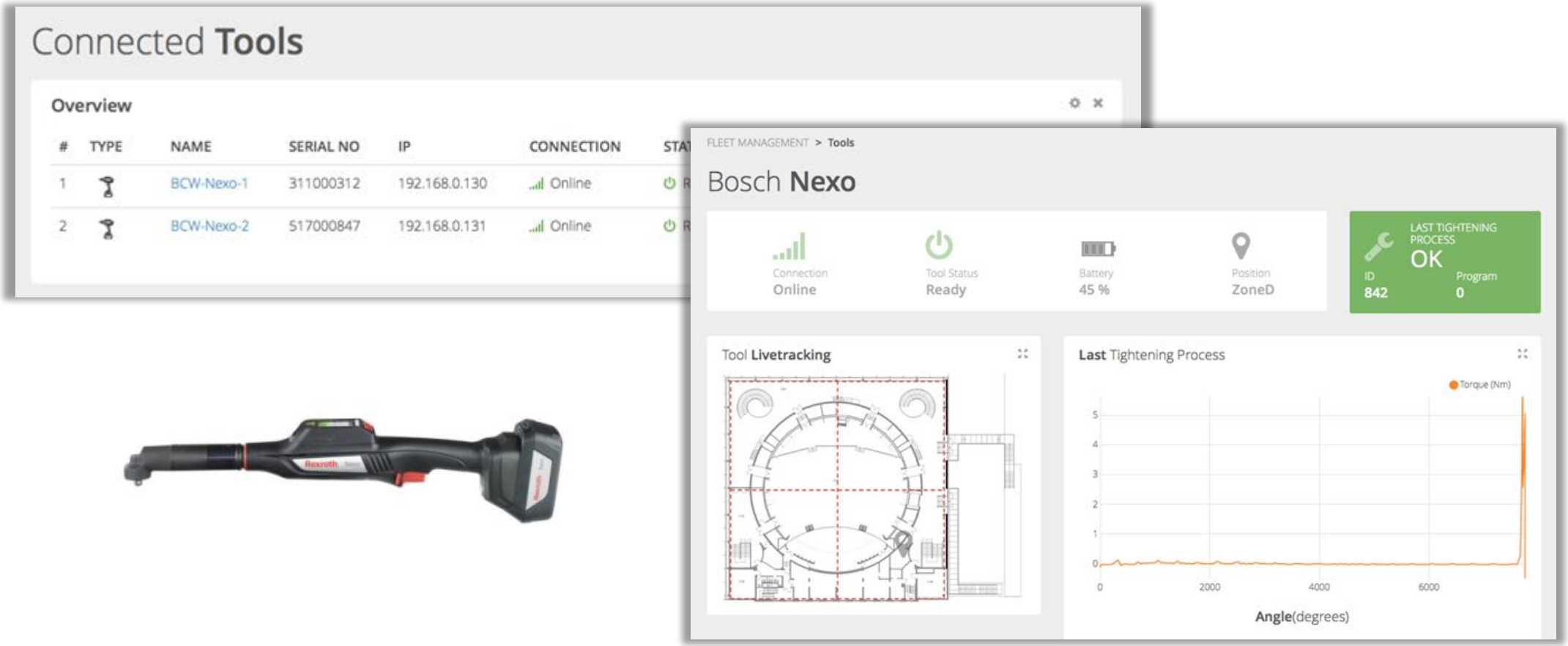
Key technical data

- Rotational speeds of up to 1,500 rpm
- Torque of up to 50 Nm in the output expansion stage
- Acquisition of torque and angle of rotation possible
- 2.4 and 5 GHz Wi-Fi
- Integrated screw point lighting
- Suitable for class A tightening connections in accordance with VDI/VDE2862

Track & Trace Testbed

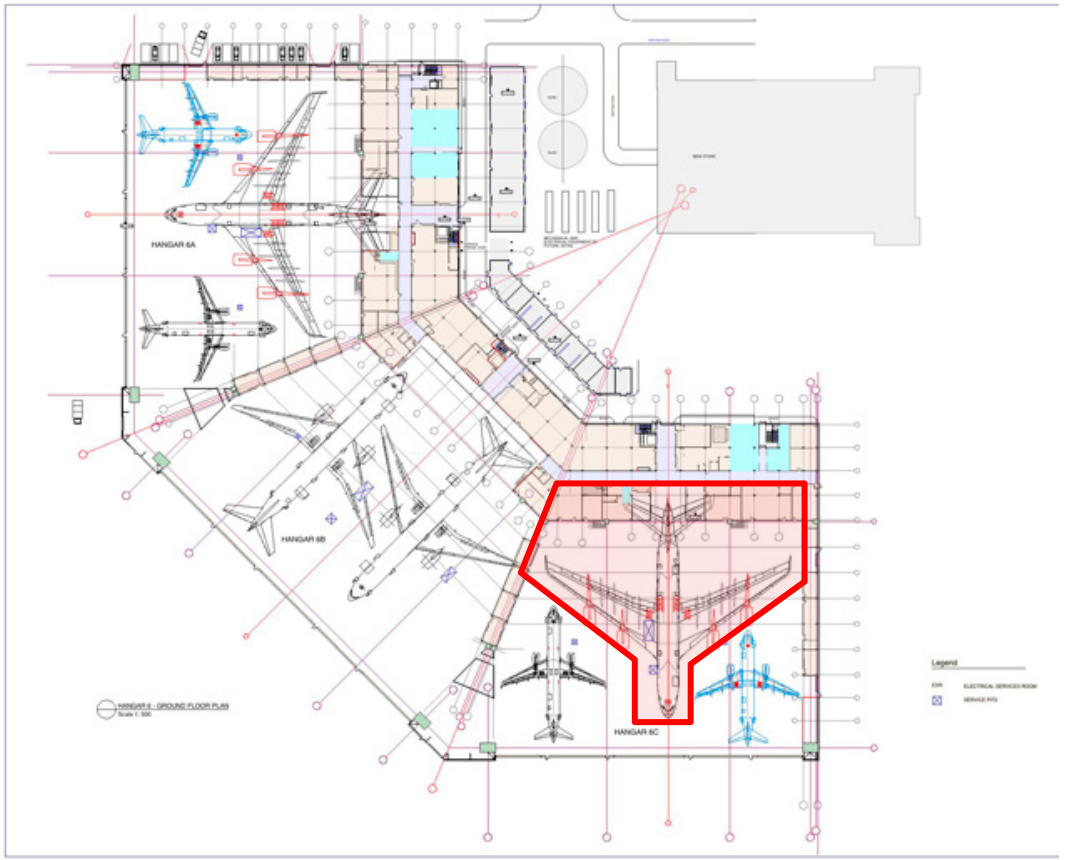


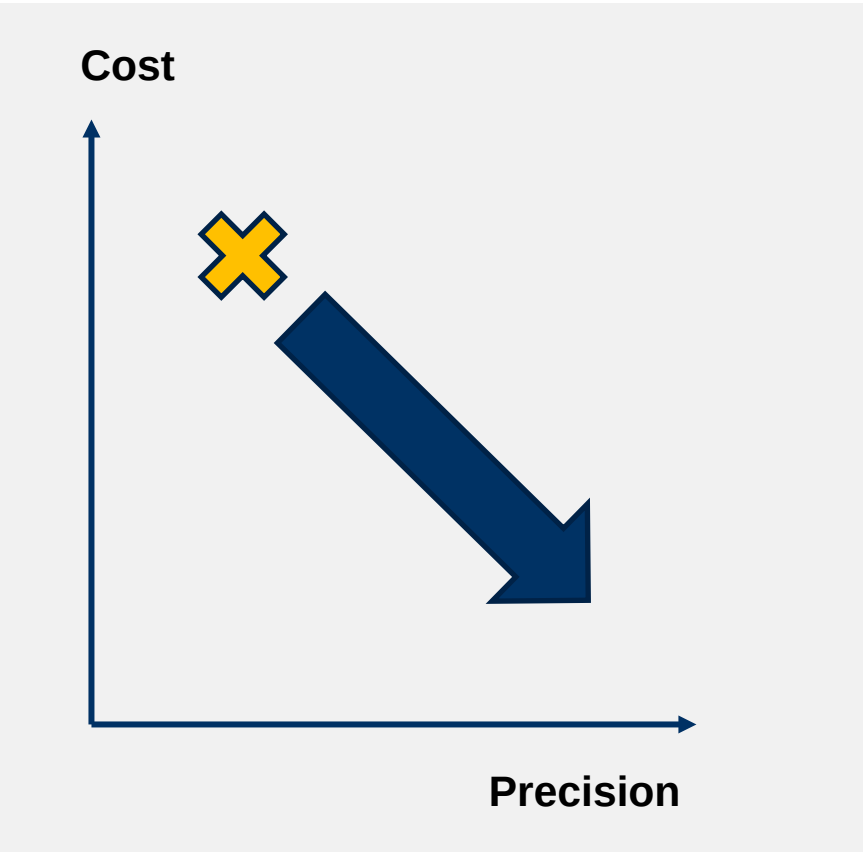
T&T Phase 1: Tool Fleet - Status & History



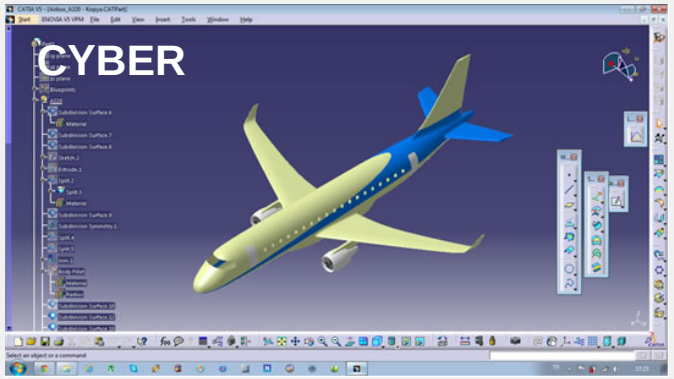
T&T Phase 1: (Big) Data Analytics

T&T Phase 1: Indoor Localization





T&T Phase 2: Goal

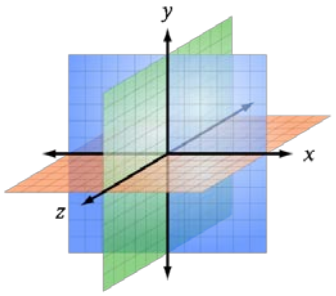


Problem Resolution

3D PLM / MES

Set-up data

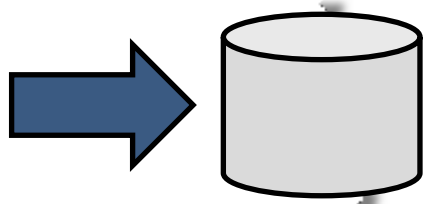
Performance data



High-Precision Localization

T&T: Open Source & Standardization

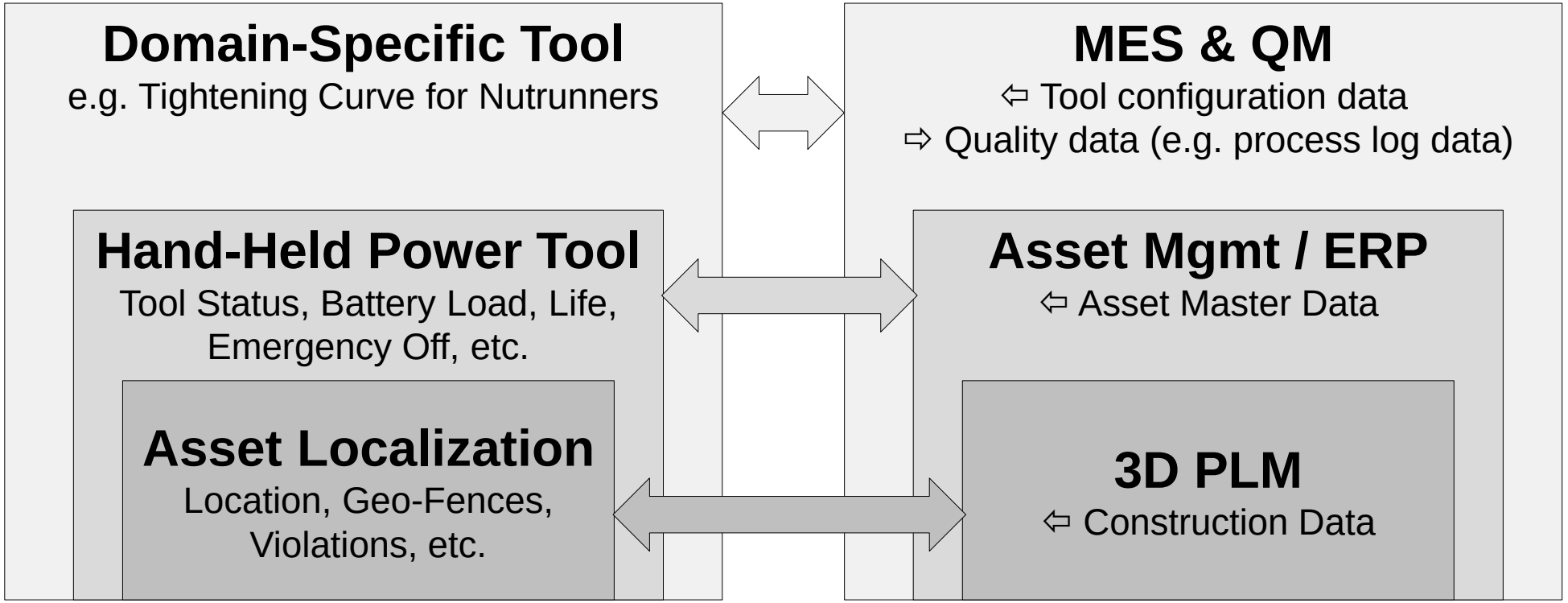
```
functionblock Nutrunner {
        displayname "Nutrunner"
        description "Function block model for Nutrunner"
        vendor www.bosch.com
        category demo
        version 1.0

        configuration{
                // Describes the current defined configuration of the nutrunner
                optional program as int
        }

        status {
                // Defines the status updates a Nutrunner provides
                optional lastMaintenance as datetime
                optional totalCycles as int
                optional totalCyclesSinceLastMaintenance as int
                optional currentTorque as float
                optional currentAngle as float
                optional nutrunnerStatus as string
                optional batteryStatus as int
                optional systemStatus as systemStatus
        }

        operations{
                // Operations which can be invoked on the device
                getArchivedTighteningResult(tighteningId as int) returns tighteningResult
                getTorque() returns float
```



Vorto (Eclipse Foundation/Open Source):
- Information Models for the IoT
- Repository to manage large numbers of versioned interfaces for IoT Assets and Devices
- Ideal fit for heterogeneous fleets of different power tools (T&T)

Standardization: Currently liaising with OMG to define process for standardization of T&T interfaces (based on Vorto)

T&T: Open Source & Standardization



Track & Trace Open Source and Standardization

Requirements

- ➔ Support for Indoor and Outdoor Localization incl. Geo-Fences, Events, etc.
- ➔ Support a big variety of technologies and products
- ➔ Outcome needs to be modeled as Function Blocks as well as Information Models
  - Incl. Accuracy, events, angulating methods,
- ➔ Function blocks and Information Models shall be available as Open Source in the Vorto Repository (EPL)
- ➔ Integration in 3D PLM, Asset Management Systems, MES via Vorto Code Generators

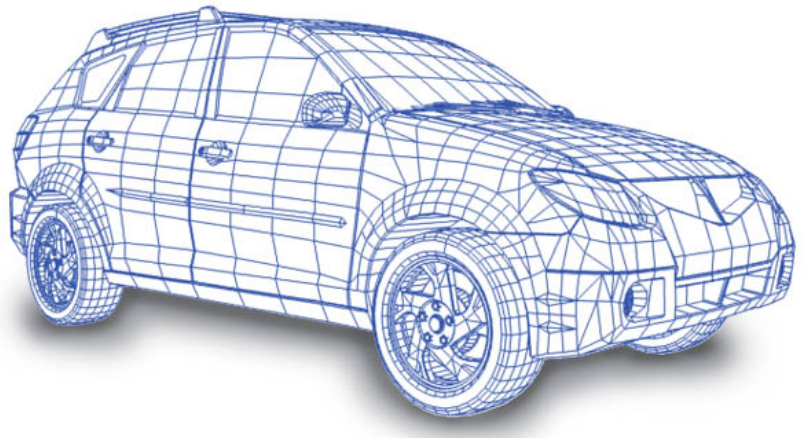
Track and Trace Open Source and Standardization

Next Steps

- ➔ Define additional Use Cases related to the Track & Trace Testbed
- ➔ Collection of localization technologies and products and analyse their capabilities
  - GSM, UMTS, Satellite, GPS, Wifi, RFID, UWB, LORA, SigFox,
  - Ubisense, Cisco, S3 ID, Zebra, Quantitec, Decawave
- ➔ Evaluate the feasibility of a Vorto UML code generator

GTM & T&T Customer Advisory Board

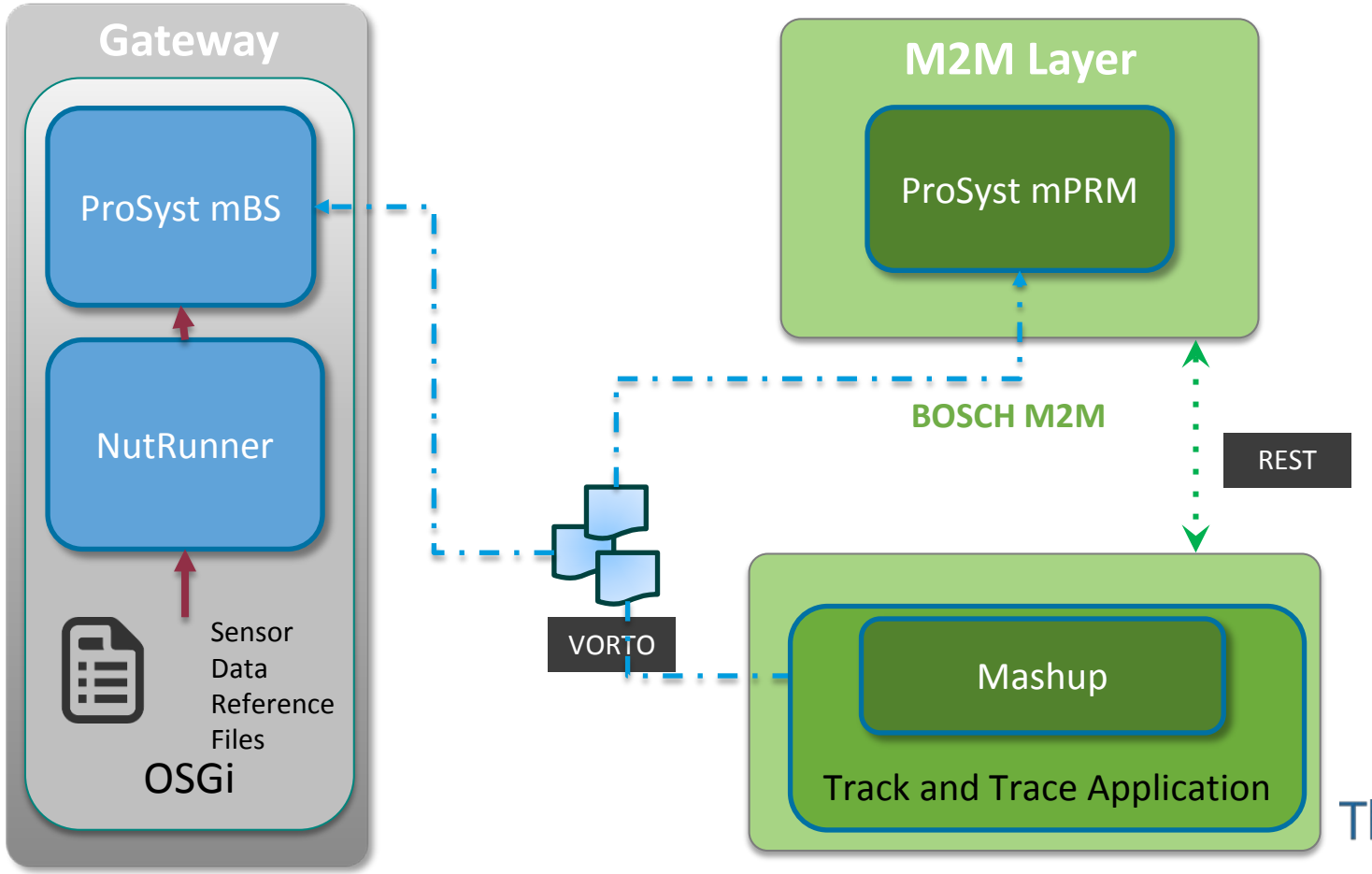
- ➔GTM
  - Gather and validate requirements and use cases
  - Initiate PoCs and initial projects
- ➔CAB (Customer Advisory Board)
  - One large OEM
  - One aircraft manufacturer
  - One aircraft operator




Rexroth
Nexo
Vorto
Describe. Share. Integrate.
Bosch IoT Suite
ThingWorx
A PTC Business

An Example for a NUTRUNNER MASHUP

Architecture



Questions?
Thank You!