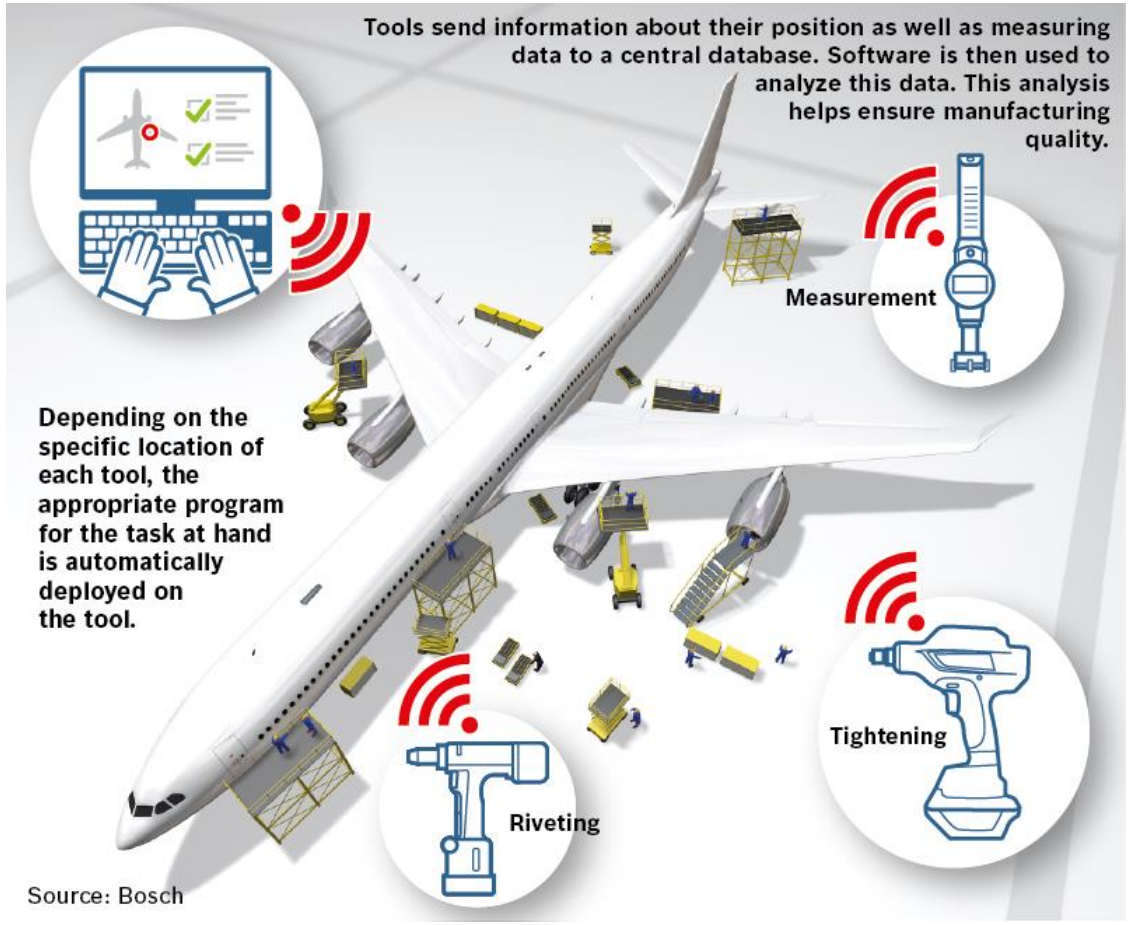
OMG Meeting, La Jolla, Dec 10th, 2015

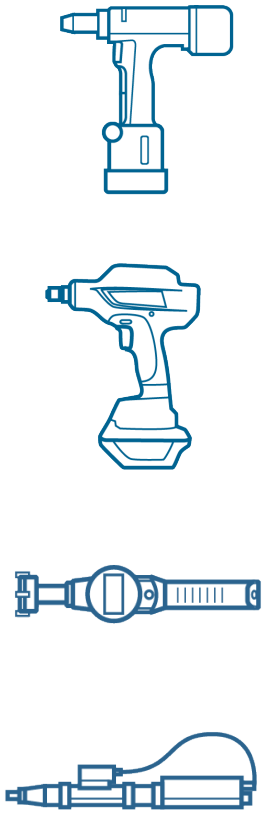
Standardization for the IIC Track & Trace Testbed

Dirk Slama, Director Bus. Dev., Bosch Software Innovations

Track & Trace Testbed



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

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

Connected **Tools**

Overview

#	TYPE	NAME	SERIAL NO	IP	CONNECTION	STAT
1		BCW-Nexo-1	311000312	192.168.0.130	Online	
2		BCW-Nexo-2	517000847	192.168.0.131	Online	

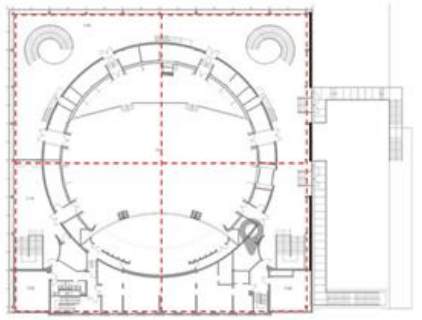
FLEET MANAGEMENT > Tools

Bosch **Nexo**

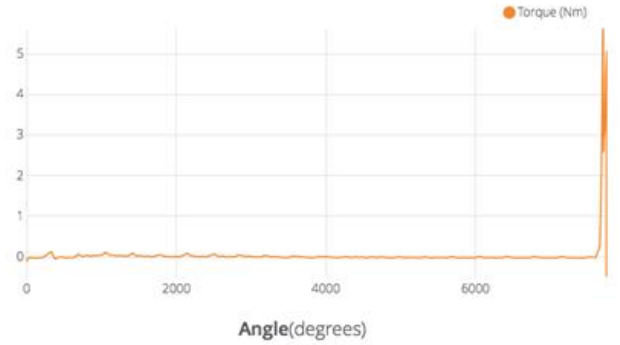
Connection	Tool Status	Battery	Position
Online	Ready	45 %	ZoneD

LAST TIGHTENING PROCESS
OK
ID 842
Program 0

Tool **Livetracking**

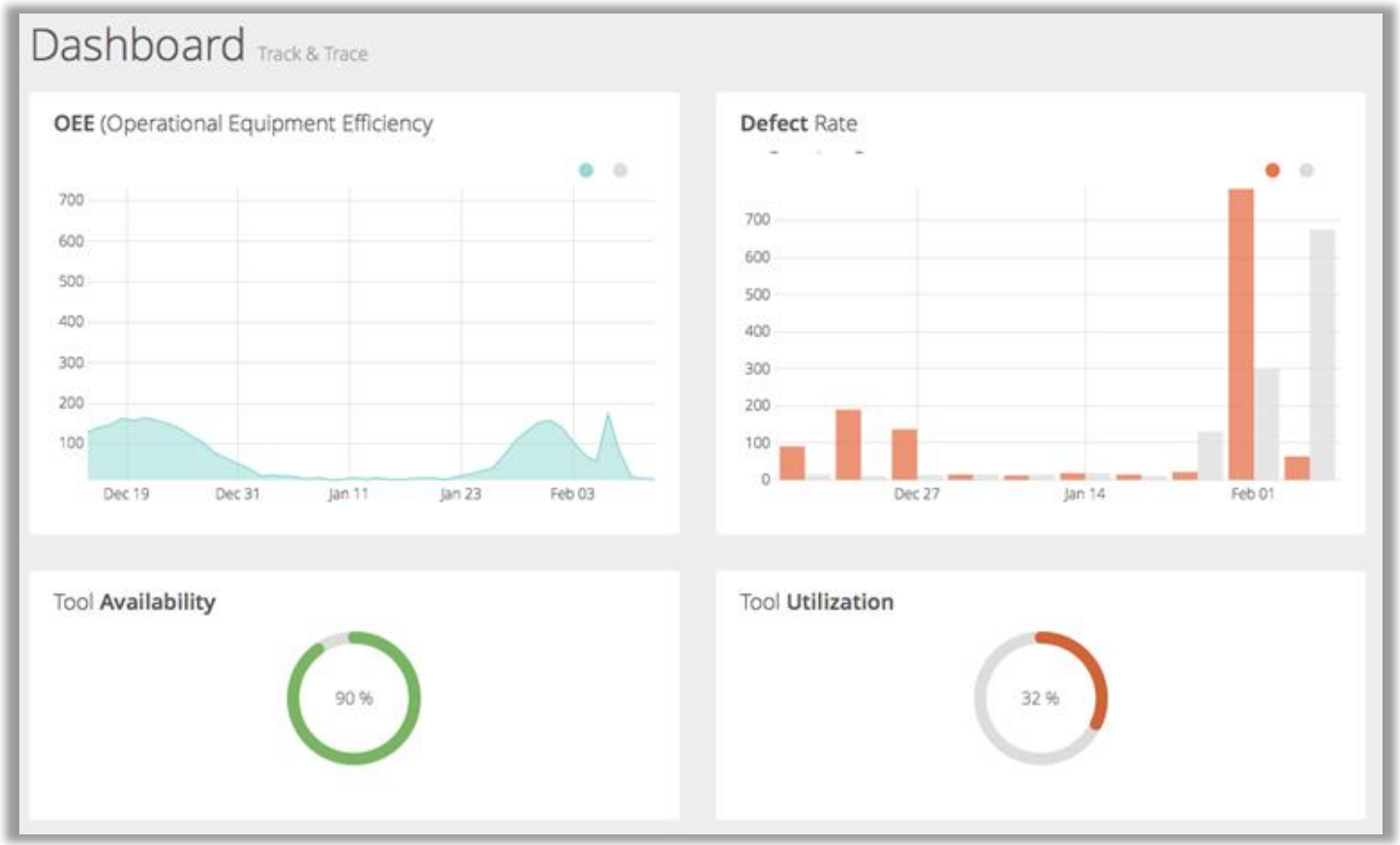


Last Tightening Process

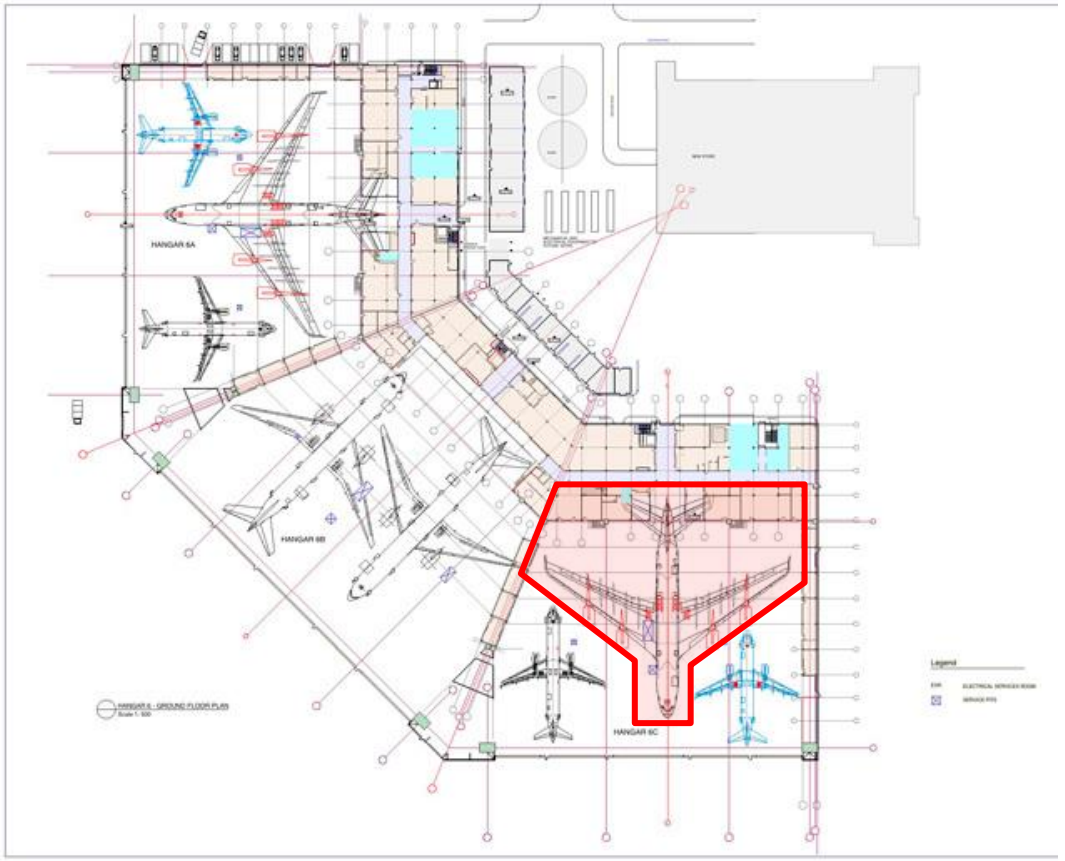


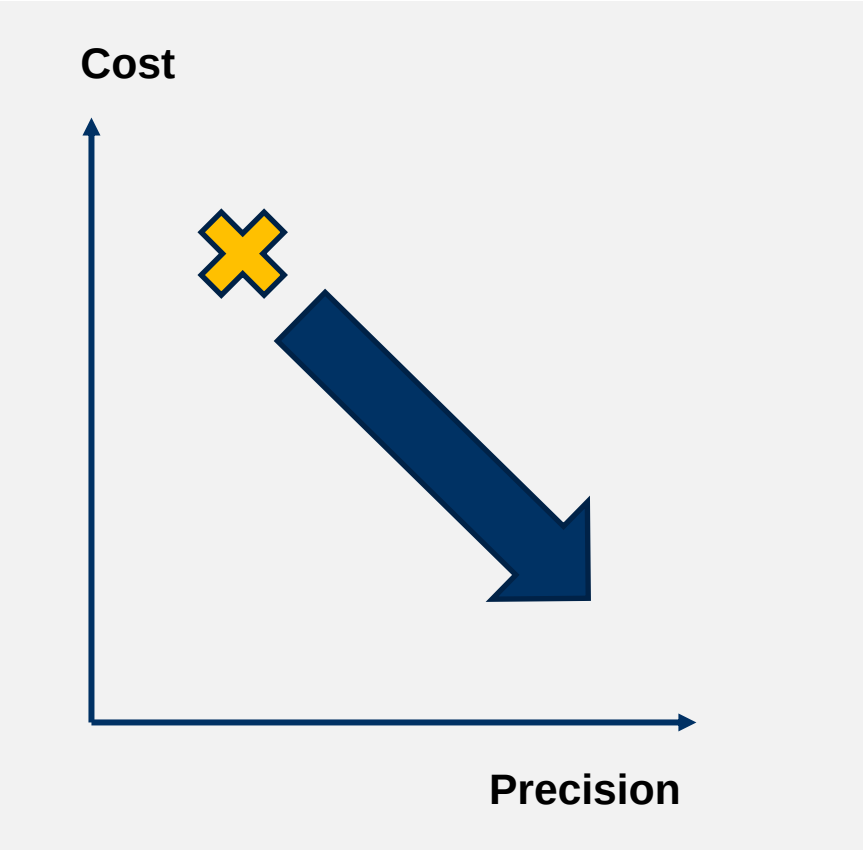
T&T Phase 1: (Big) Data Analytics

T&T Phase 1: Dashboards

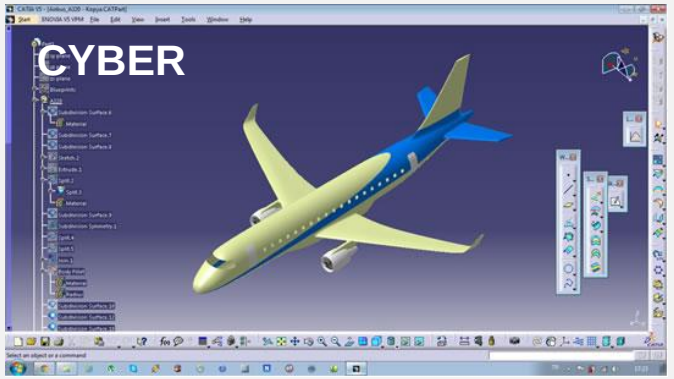


T&T Phase 1: Indoor Localization





T&T Phase 2: Goal

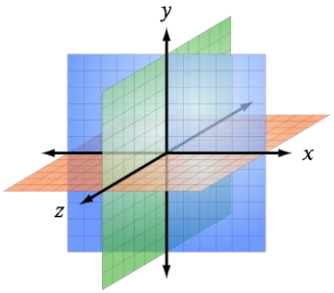


Problem Resolution

3D PLM / MES

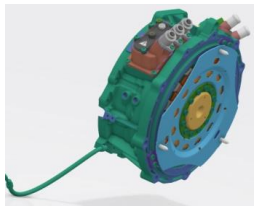
Set-up data

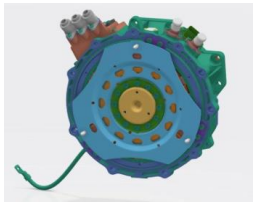
Performance data

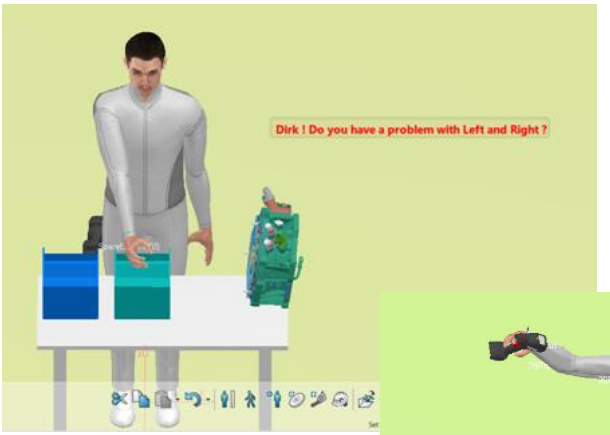


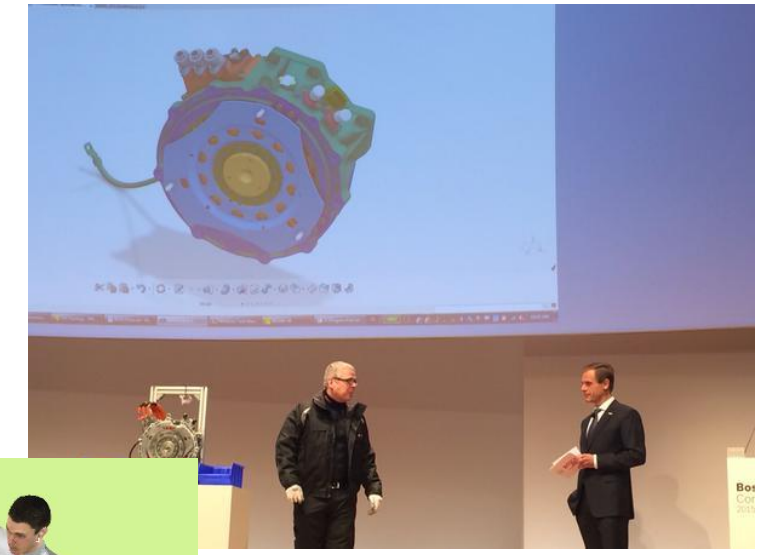
High-Precision Localization

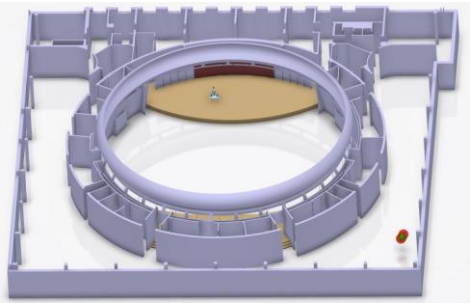
T&T Phase 2





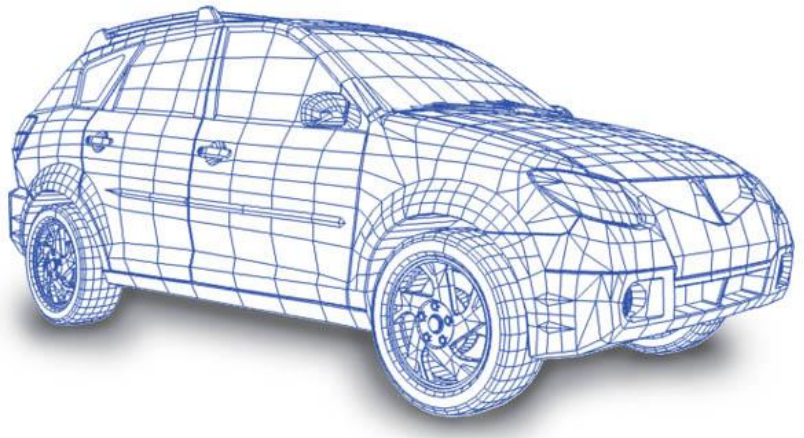






GTM & T&T Customer Advisory Board

- ➔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

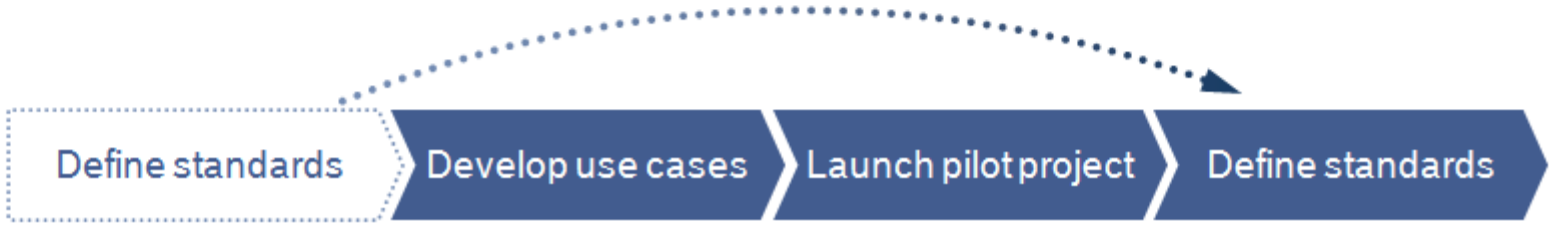


Standardization

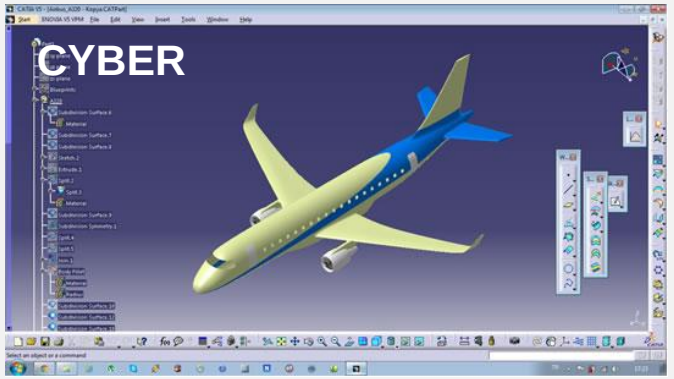
I believe that developing standards, if you don't know what standards you need, is a waste of time. So how do you find out what you need? It's not just developing the use cases. It's building it, testing it, and seeing what works.

I call it the Nike effect: just do it!

Dr. Richard Soley, Executive Director, Industrial Internet Consortium (IIC)



Standardization Areas



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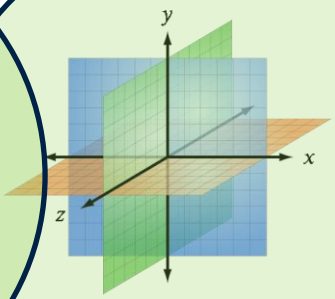
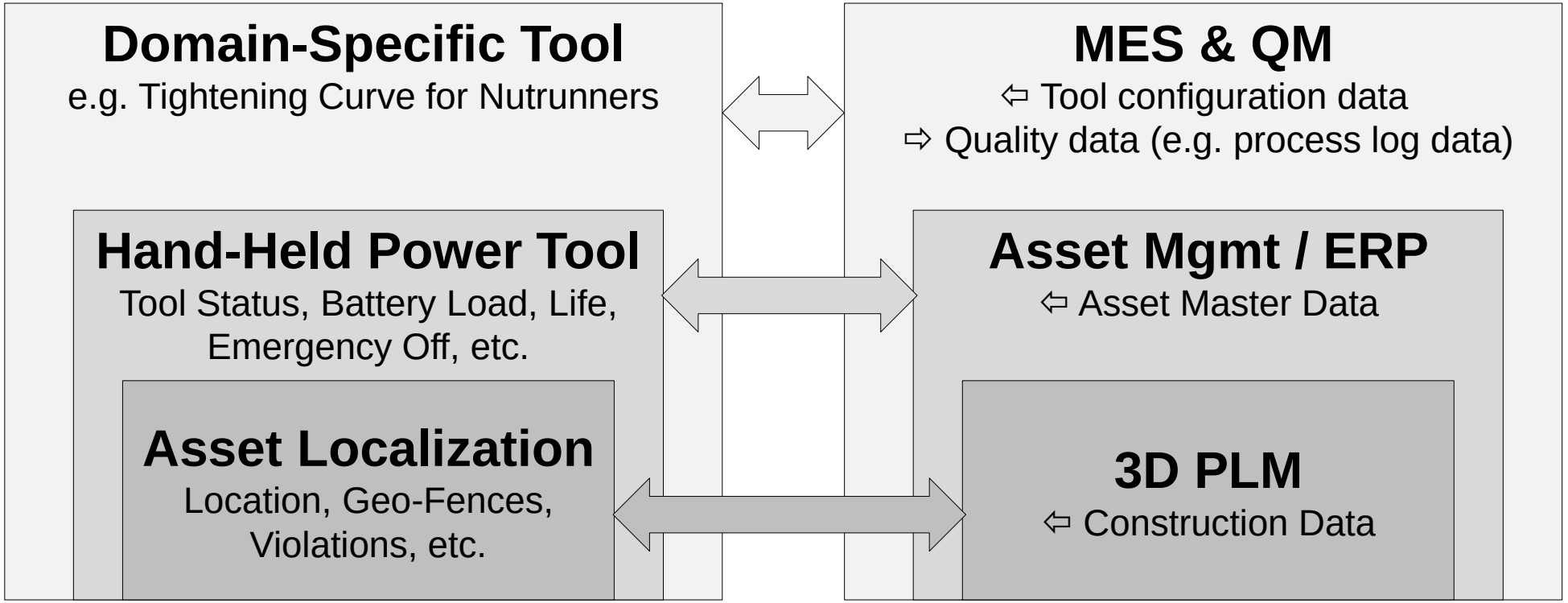


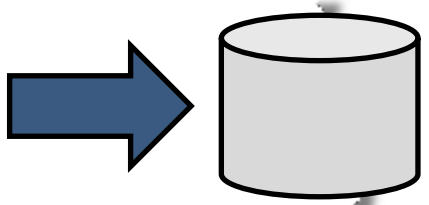
High-Precision Localization

T&T: Open Source & Standardization



T&T: Open Source & Standardization

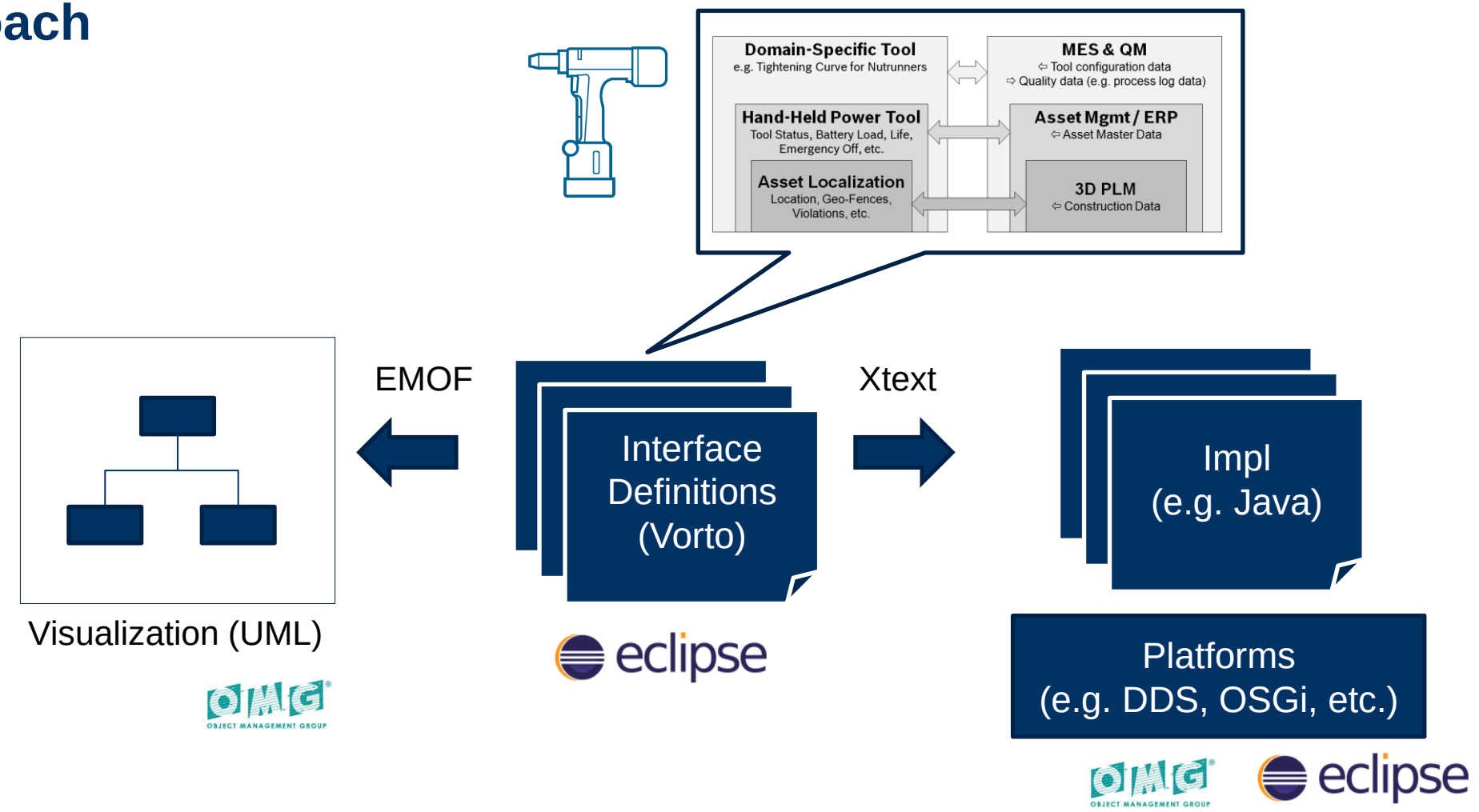
```
functionblock Nutrunner {
        displayname "Nutrunner"
        description "Function block model for Nutrunner"
        vendor www.bosch.com
        category demo
        version 1.0

        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)

Approach



Questions?
Thank You!