PTC & BOSCH SOFTWARE INNOVATIONS – TECHNOLOGY ALLIANCE TO DELIVER INDUSTRIAL IOT SOLUTIONS

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PROSYST AS PART OF THE BOSCH GROUP

Bosch IoT Strategy

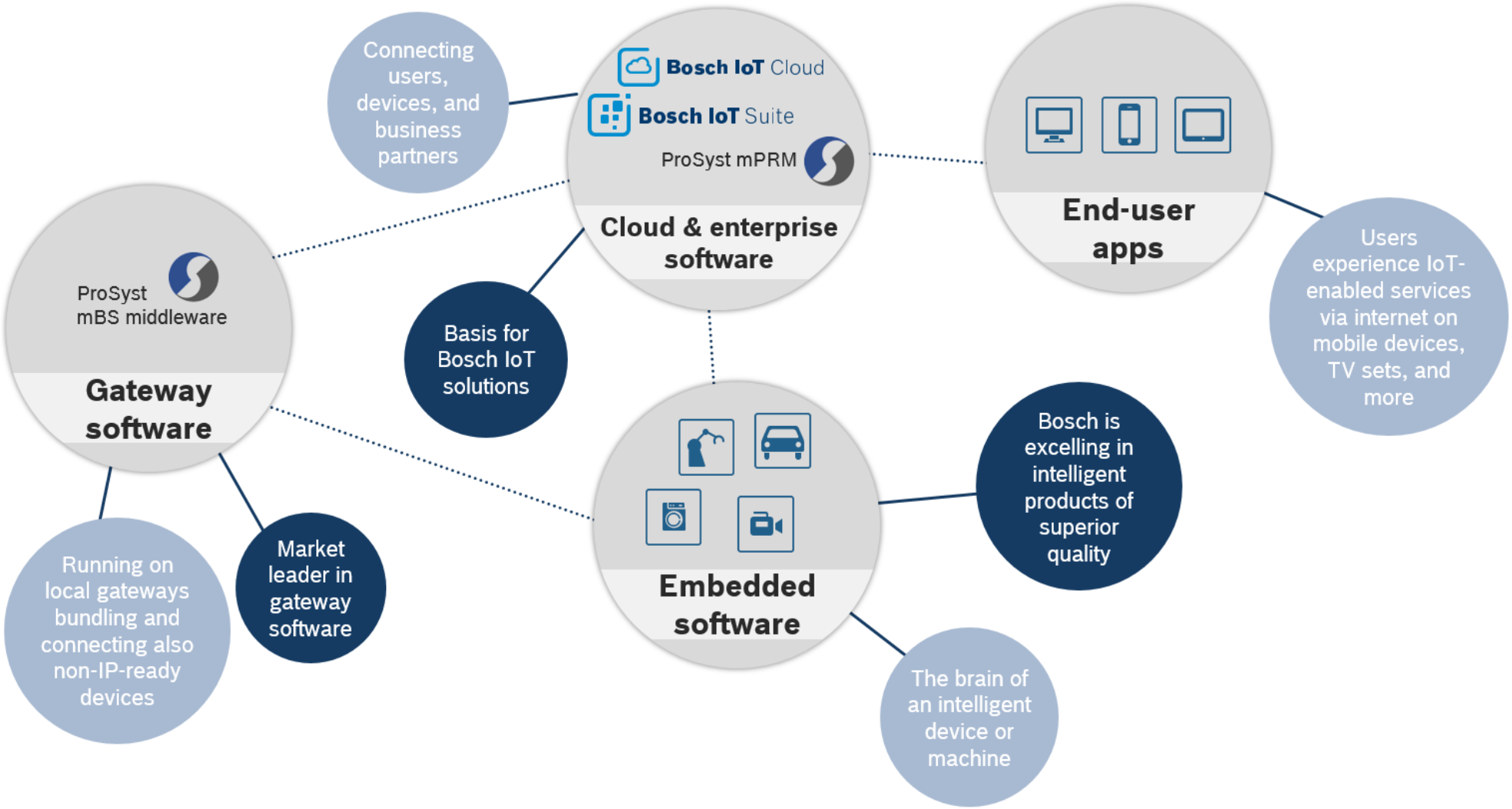
- Enabling connectivity in many areas of daily life and work
- Triad: sensor, software, service
- Systematically expand IoT software competencies
- Bosch electronic products are web-enabled to deliver fascinating new services
- Expand and foster IoT ecosystems
- Establish an open IoT platform with partners

How does ProSyst fit into this strategy?

- ProSyst is market leader in gateway software
- Provides the fastest & most efficient OSGi container in the market with backend connectivity
- Complements the Bosch IoT Suite
- ProSyst associates are highly experienced software developers for embedded and backend software

Gateway software serves as a link between connected devices and the backend.
It is part of many IoT solutions.

SOFTWARE COMPONENTS WITH STRATEGIC IMPACT ON IOT



NOBODY CAN DO I(O)T ALONE

- Technology partnership with PTC
- Alliance to deliver industrial IoT solutions

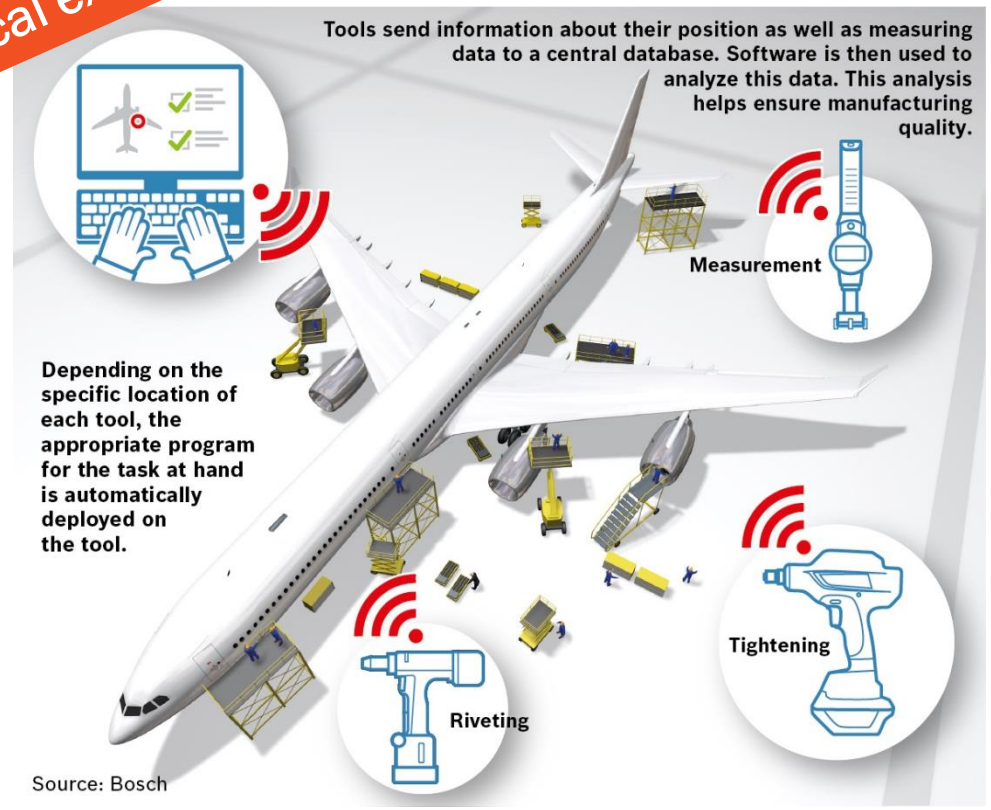
We have combined the world's best technologies to redefine the way daily work gets done and send a strong signal to the market. It has never been so easy for companies to enter into the IoT business.

Jim Heppelmann, President and CEO, PTC

THE THREE CHALLENGES OF IOT SOLUTION DEVELOPMENT

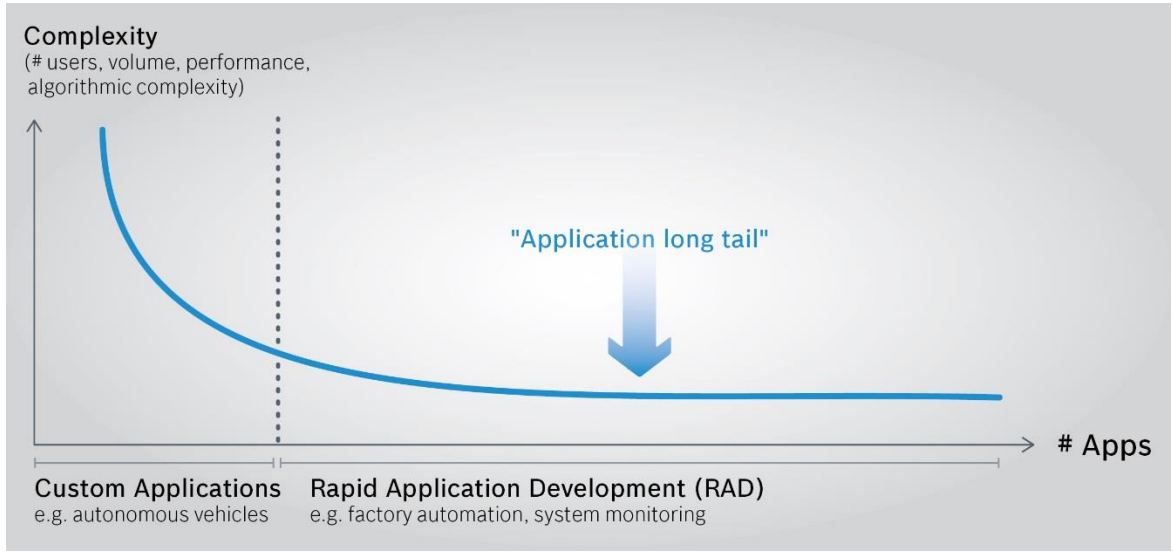
1. **Rapid application development for IoT:**
   - Quickly and efficiently building user interfaces and applications for IoT use cases that require cost efficiency and fast time to market.
2. **Managing heterogeneity and diversity:**
   - Handling large numbers of heterogeneous, constantly evolving assets and devices in the IoT.
3. **Building customizable IoT solutions:**
   - Supporting IoT solution vendors in creating solutions that can be easily customized for different use cases.

Practical example

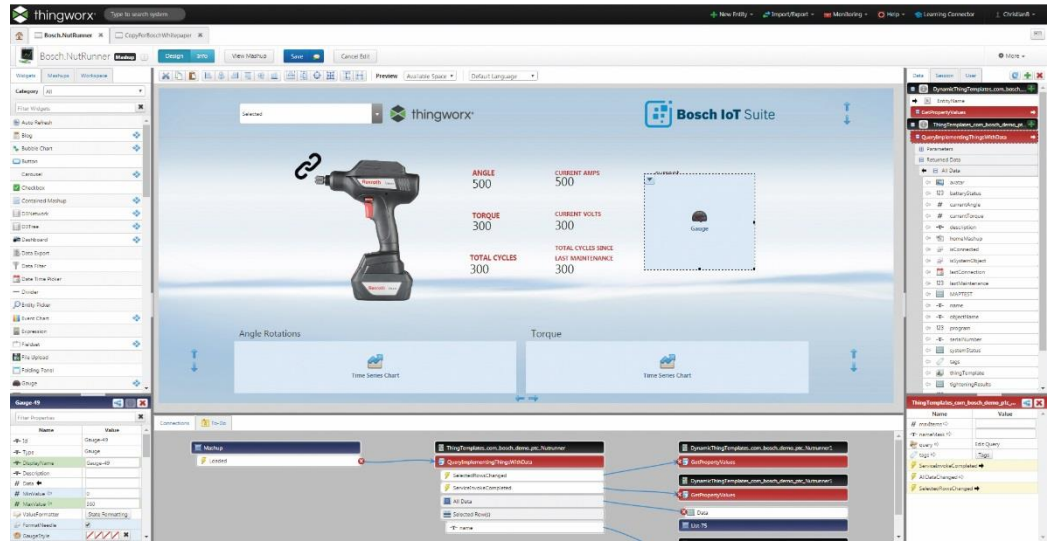


RAPID APPLICATION DEVELOPMENT FOR IOT

- Most IoT projects require applications that can be **developed and modified in a rapid and flexible manner.**

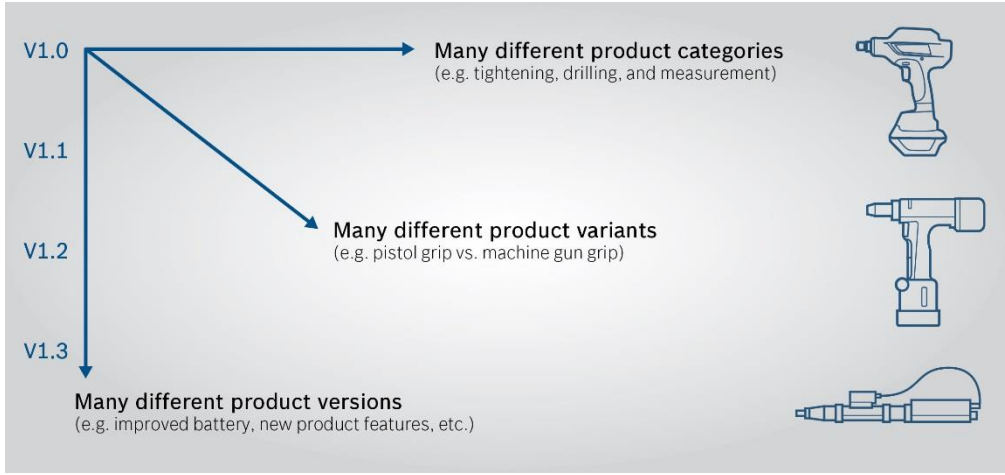


ThingWorx Mashup Builder –
Speeding up with the help of UI widgets

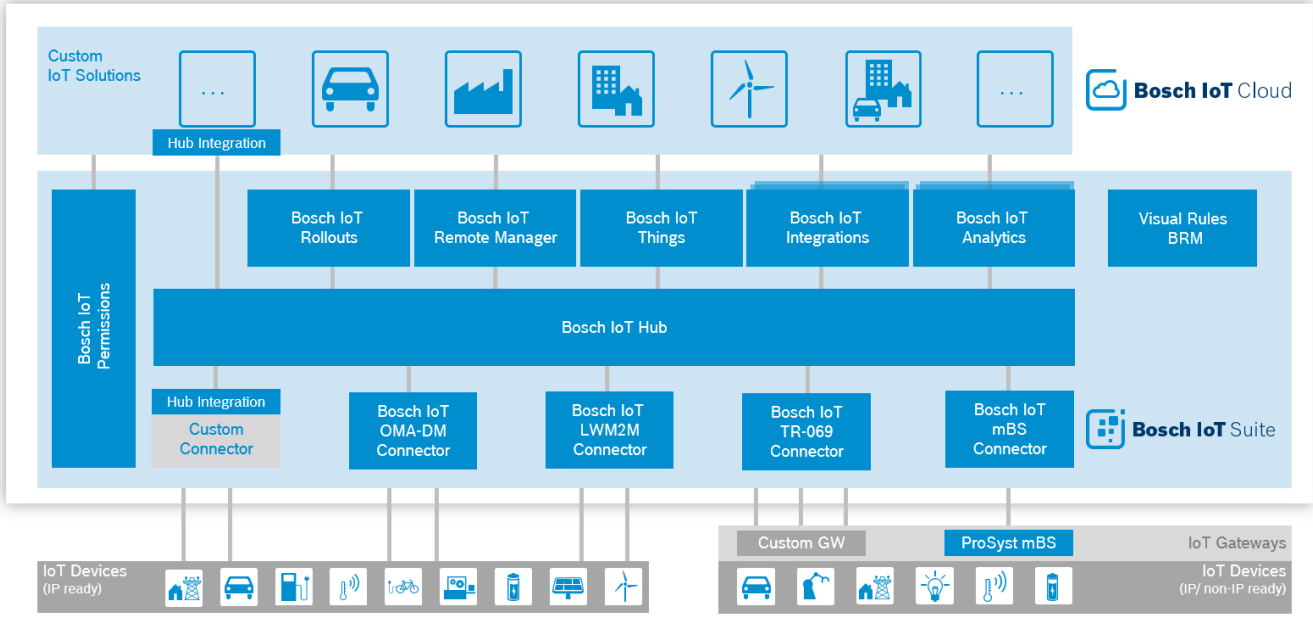


MANAGING HETEROGENEITY AND DIVERSITY

- Device heterogeneity that **needs to be solved in the Track & Trace use case.**

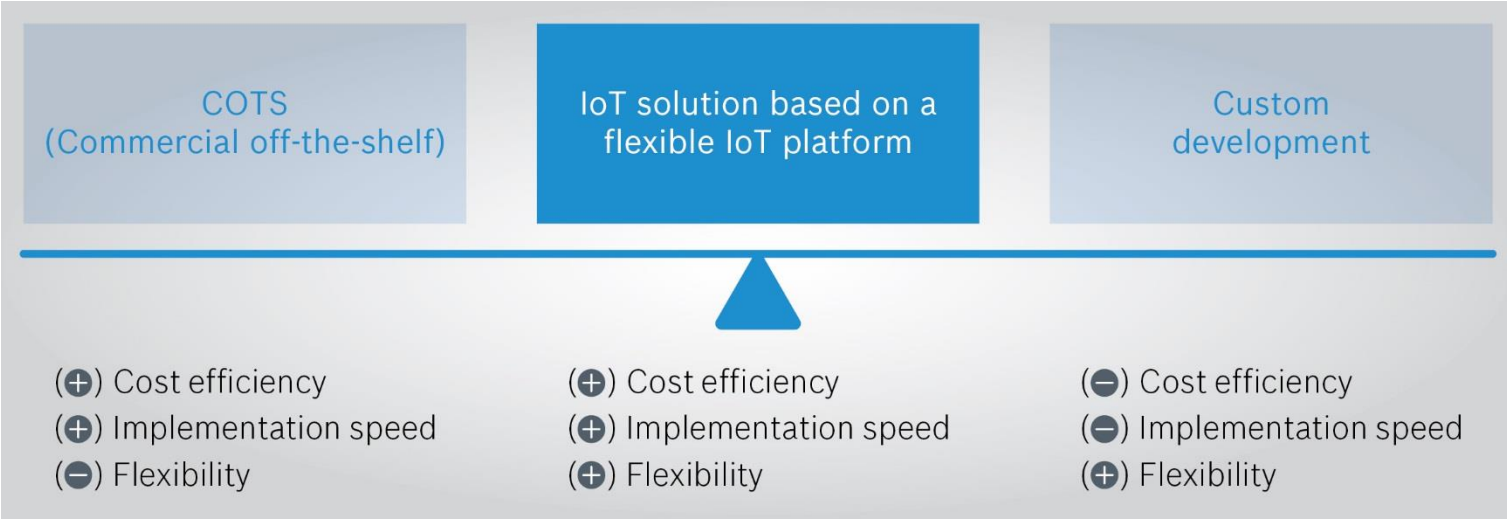


Bosch IoT Suite –
Connecting and managing devices easily



BUILDING CUSTOMIZABLE IOT SOLUTIONS

- Track & Trace customers have **individual requirements** in areas such as:
  - Different power tools: In addition to the tools supported out of the box, customers usually have other tools that need to be integrated. This requires adding new interfaces and customizing them as well as existing interfaces.
  - Specific manufacturing processes: In general, each customer has different requirements for process integration; for example, how to handle a problem that occurs during a tightening step.



Flexible combination – Allowing solution customization:

ThingWorx's RAD features

+

Flexibility of the **Bosch IoT Suite's** device management

THE “GLUE” BETWEEN

- **Eclipse Vorto**
  - Open source project initiated by Bosch Software Innovations and developed by Eclipse IoT
  - Smart, open approach on interoperability of IoT products
  - Enables creation and management of information models for integration into different platforms

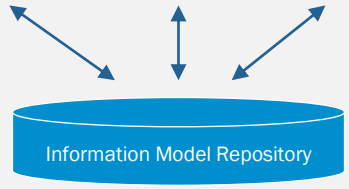
```
functionblock Nutrunner {
        displayname "Nutrunner"
        description "Function block model for Nutrunner"
        vendor www.bosch.com
        category demo
        version 1.0

        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
```

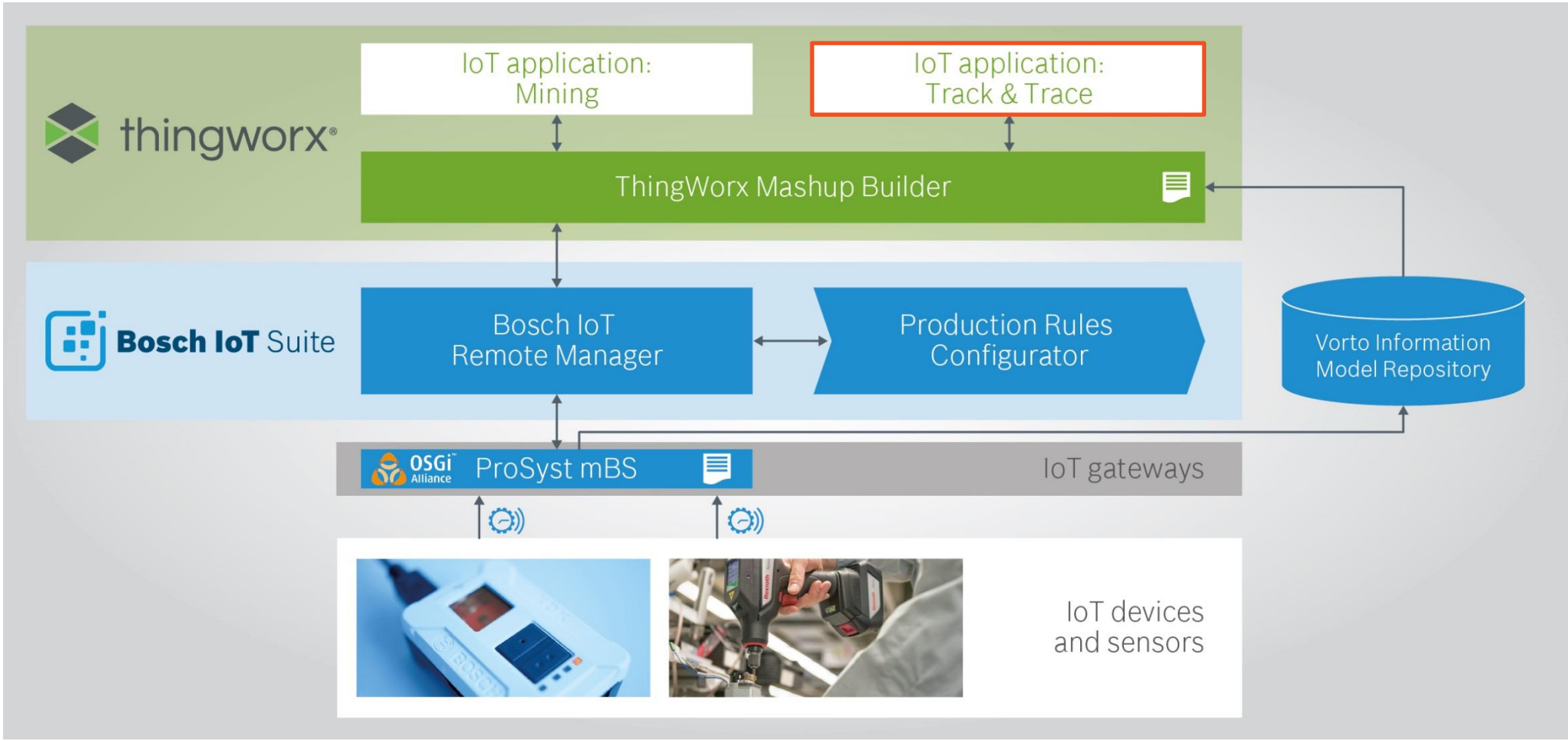
Eclipse Vorto enables **interoperability** for the Internet of Things (IoT)



The **Vorto Repository** allows to manage and share Information Models.

Vorto Information Models are detailed representations of real objects.

JOINT ARCHITECTURE



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