INDUSTRIAL INTERNET AND INDUSTRIE 4.0 - COMBINING THE BEST OF TWO WORLDS

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[Industrial] Internet of (Things|Everything)
Opportunities of the IIoT Value Chain Transformation

Product Improvements

Production Improvements

Product Performance and Usage Data

Source: Enterprise IoT

Targeted Sales

Remote Services

Remote Management

Improved Support

Digital Services
Challenges of the IIoT Value Chain Transformation

- IT meets Manufacturing
- Cultural Diversity
- Agile
- UX
- Design Thinking
- FOTA
- DevOps
- OnPrem vs Cloud

Source: Enterprise IoT
Working with IIC and I4.0 to address these Challenges

Zurich, 11/2015: Exploratory Workshop on IIC/I4.0 Collab.
Bosch ConnectedWorld, Berlin 03/2016: Presentation of IIC/I4.0 collaboration, first joint Testbed proposal
Chicago, 05/2016: Joint Workshop on architecture, testbeds and standardization
Walldorf, 09/2016: Joint IIC/I4.0 Event, hosted by Bosch and SAP

1. Complementary Domain Focus
2. Cross-Domain Interoperability
3. Testbed Collaboration
Working with IIC and I4.0 to address these Challenges

- **Testbeds**
  Validate New Technologies and Concepts
  Foster Creation of Partner Ecosystems

- **Reference Architectures**
  Provide Guidance
  Create a Common Language

- **Best Practices**
  Accelerate Project Execution

- **Interoperability & Standards**
  Enable “Things” to Interact

- **Projects & Deployments**
  Ensure Commercial Success
Working with IIC and I4.0 to address these Challenges

- Testbeds
- Reference Architectures
- Best Practices
- Interoperability & Standards
- Projects & Deployments
Testbeds Help Driving Innovation

1st public IIC testbed: Track & Trace (Bosch, TechM, Cisco)

- 2015: From idea to commercial deployment in less than 1 year
- 2016: New use case „Forklifts“ (Bosch & SAP)

Value

- Validate technologies
- Blueprints for commercial solutions
- Generate best practices and standards
- Promote creation of partner ecosystems

Testbeds @ I4.0

- Bosch has joined Labs Network Industrie 4.0
- Support I4.0 testbeds
- Enable further collaboration between IIC and I4.0
- Foster integration of SME’s into IIoT value chain
Problems

Plant Logistic

“I think, that our forklift drivers drive inefficient ways and have too many and too long empty runs, but I don’t know it exactly.”

Fleet Manager

“The operating costs are too high and we have no real-time transparency about the efficiency level of our fleet.”

Safety Officer

“We want to avoid personal injury to 100% as well as damage to buildings and equipment”
Solution

SAP IoT Applications, Vehicle Insight

BOSCH
Field data aggregation, correlation, micro-services

SAP ERP, EWM, Analytics
Where IIC and I4.0 are Adding Value

- Testbeds
- Reference Architectures
- Best Practices
- Interoperability & Standards
- Projects & Deployments
IIC and I4.0 Help Managing the IIoT Value Chain

**RAMI4.0**
I4.0 Reference Architecture

- Provides common language
- Maps physical to virtual world
- Covers product life cycle

**IIRA**
IIC Reference Architecture

- Provides common language
- Reduces complexity
- Ensures scalability
Where IIC and I4.0 are Adding Value

- Testbeds
- Reference Architectures
- Best Practices
- Interoperability & Standards
- Projects & Deployments
Best Practices Help Ensuring Project Success

Best Practice =

Reference Architecture

+ Project Experience

Need for

• Certified IIoT experts
• Tools and support for IIoT project managers
• Lean description of best practices
Re-Usable Best Practices, derived from Testbeds

IioT Solution Lifecycle (IIC BSSL)

Plan ➔ Build ➔ Run

Asset Preparation
Link between IioT Solution and I4.0 Manufacturing

Type ➔ Instance
RAMI4.0, Lifecycle Dimension #2

I4.0 Manufacturing

Manufacturing Cloud

Asset Operations Cloud

Bosch
Re-Usable Best Practices, derived from Testbeds

IIoT PROJECT TOOLKIT

I4.0 EXTENSION

IIoT Solution Lifecycle (IIC BSSL)

Asset Preparation

Link between IIoT Solution and I4.0 Manufacturing

Example: Change asset design to provide required fixtures for sensors and telematics unit of IIoT solution. Also, prepare asset production to include assembly of sensors and gateway, plus pairing of final asset with digital twin.

RAMI4.0, Lifecycle Dimension #2

I4.0 Manufacturing

Manufacturing Cloud

I4.0 EXTENSION

IIOT PROJECT TOOLKIT
Where IIC and I4.0 are Adding Value

- Testbeds
- Reference Architectures
- Best Practices
- Interoperability & Standards
- Projects & Deployments
From Testbeds to Standards

- Production Performance Management (PPM) testbed: Bosch plant in Homburg
- Optimization of production performance: on-time delivery, OEE, energy utilization

- Open standard, derived from Homburg PPM testbed
- High relevance for both, SME’s and large enterprises
PPM Protocol Ensures Interoperability

PPM Protocol
- Easy to use
- Utilizes standard Internet technologies
- Open source

PPM
Data aggregation (digital twin) and conversion to KPI's

PPM dashboard, advanced analytics, simulation

Machine components, sensors, ...

Energy, HVAC, building, ...

PPM Protocol

Industrial Internet CONSORCIUM

INDUSTRIE 4.0
PPMP Ecosystem

Enterprise PPM Testbed

Production Simulation

Enterprise System Integration (ERP, MES)

RAMI4.0 Admin Shell Integration

Micro-Testbeds

Sensor Data Integration

Energy Data Integration

Machine Data Integration

Production Performance Management
Summary

- IoT transforms traditional industrial value chains
- Bosch already uses IoT solutions in own plants
- For broad deployment and accessibility especially for SME’s interoperability is key
- PPMP as an example for standardization through open source
- Bosch supports IIC and I4.0 consortia and their initiatives