THE SMART FACTORY JOURNEY – FROM COLLABORATION TO TRANSFORMATION

Dirk Slama, Chief Alliance Officer
Bosch Software Innovations GmbH
[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

Product Improvements

Opportunities

- Remote Management
- Remote Services
- Improved Support
- Digital Services

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Challenges of the IIoT Value Chain Transformation

Source: Enterprise IoT

IT meets Manufacturing

Cultural Diversity

UX

Agile

FOTA

DevOps

OnPrem vs Cloud

Design Thinking
Working with IIC 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 to address these Challenges

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**Industrial Internet Consortium**

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Testbeds Help Driving Innovation

1\textsuperscript{st} 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
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
SAP ERP, EWM, Analytics
Where IIC is Adding Value

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

IIRA
IIC Reference Architecture

- Provides common language
- Reduces complexity
- Ensures scalability
Working with IIC and I4.0

1. Complementary Domain Focus
2. Cross-Domain Interoperability
3. Testbed Collaboration
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 is 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

Plan ➔ Build ➔ Run
IloT Solution Lifecycle (IIC BSSL)

Asset Preparation
Link between IIoT Solution and I4.0 Manufacturing

Type ➔ Instance
RAMI4.0, Lifecycle Dimension #2

IloT Solution
Asset Operations Cloud

I4.0 Manufacturing
Manufacturing Cloud
Re-Usable Best Practices, derived from Testbeds

**IIoT PROJECT TOOLKIT**

**I4.0 EXTENSION**

**Plan**
IIoT Solution Lifecycle (IIC BSSL)

**Build**

**Run**

**Asset Preparation**
Link between IIoT Solution and I4.0 Manufacturing

**Type**
RAMI4.0, Lifecycle Dimension #2

**Instance**

**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.

IIoT Solution

Asset Operations Cloud

I4.0 Manufacturing

Manufacturing Cloud
Where IIC is 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
IIC`s Industrial Internet Interoperability Coalition – I3C

IloT Use Cases
- Remote Management
- Predictive Maintenance
- Process Optimization
- OEE (Operational Equipment Efficiency)

IloT Verticals
- Transportation
- Public Sector
- Manufacturing
- Healthcare
- Energy

IloT Architectures & Patterns
- 3-Tier IloT (Edge2Cloud)
- Gateway mediated edge connectivity
- Data Bus Pattern
- Big Data with CEP
- Peer2Peer
- ...
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 is a strong supporter of IIC