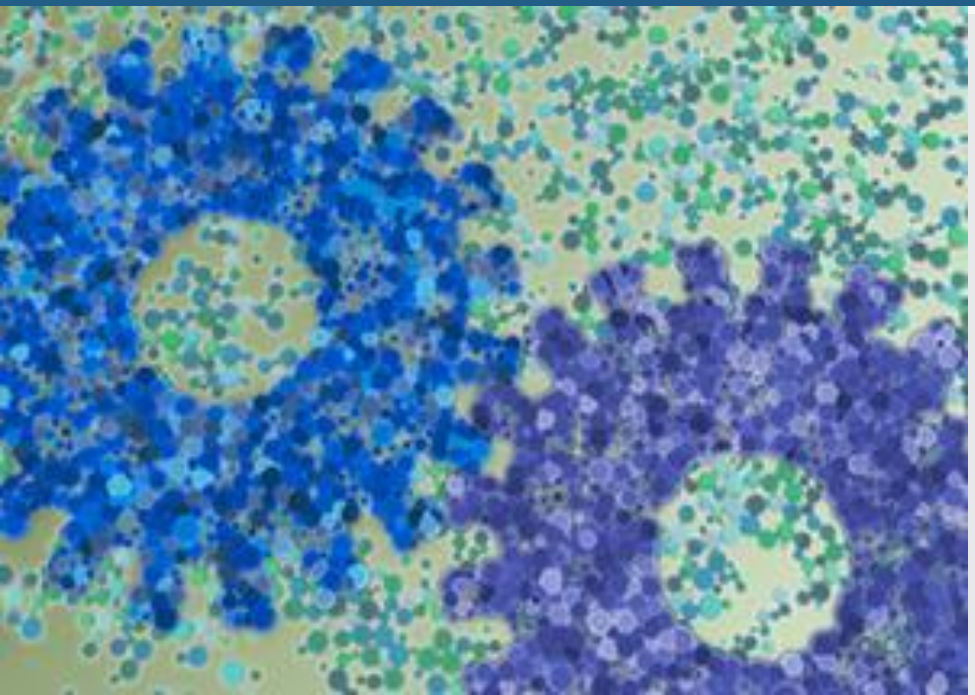
COMPOSITION - Ecosystem for Collaborative Manufacturing Processes – Intra- and Interfactory Integration and Automation



# IoT Applied to Factories of the Future

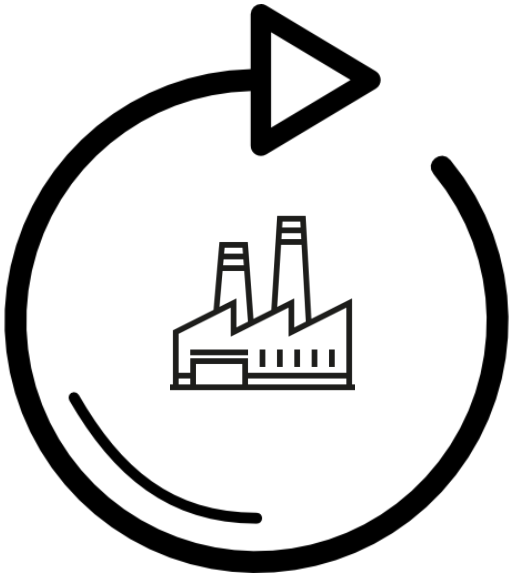
Marc Jentsch

Fraunhofer FIT

Co-funded by the European Union

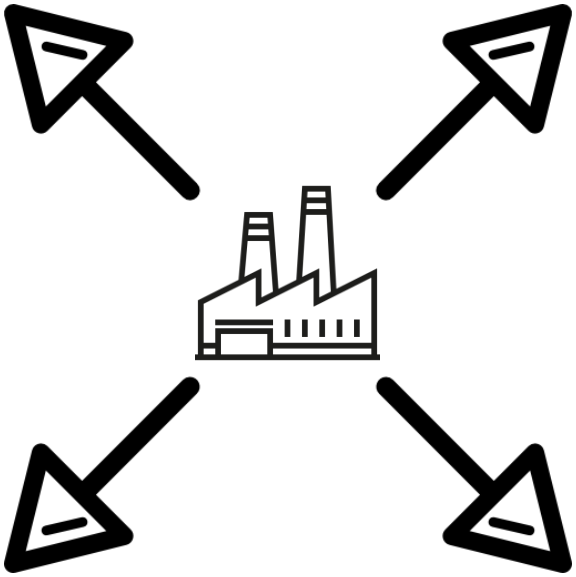
COMPOSITION

# COMPOSITION



Intra Factory

Value Chain



Inter Factory

Supply Chain

# Introduction of Pilot Partners

Boston Scientific

- Medical Device Manufacturer
- Optimization of Internal Processes

KLEEMANN™

- Lift Manufacturer
- Optimization of Waste Processes

ΕΛΔΙΑ
ΕΛΛΗΝΙΚΗ ΔΙΑΧΕΙΡΙΣΗ ΑΠΟΡΡΙΜΜΑΤΩΝ Α.Ε

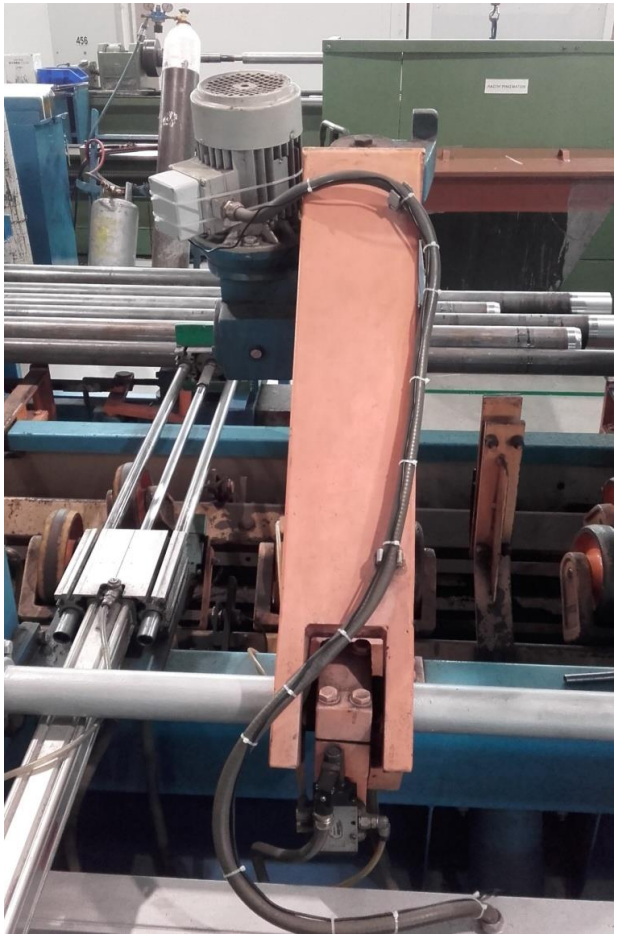
- Recycling Company
- Customer Relationship with Kleemann

# Use Cases

| Tier | Use Case |
|---|---|
| Tier 1 | UC-BSL-2 Predictive maintenance |
| | UC-KLE-1 Maintenance decision support |
| | UC-KLE-4 Scrap metal collection and bidding process |
| | UC-ELDIA-1 Fill-level notification – Contractual wood and recyclable materials management |
| Tier 2 | UC-BSL-5 Equipment monitoring and line visualization |
| | UC-KLE-2 Delayed process step |
| | UC-BSL-3 Component tracking |
| | UC-ATL-3 Searching for recommended solutions |
| Tier 3 | UC-KLE-3 Scrap metal and recyclable waste transportation |
| | UC-BSL-7 Automatic long  term tracking of high value materials for physical security |
| | UC-BSL-4 Automatic solder paste touch up |
| | UC-KLE-7 Ordering raw materials |
| | UC-ATL-1 Selling software/consultancy |
| | UC-ATL-2 Searching for solutions |
| | UC-ATL/NXW-1 Integrate external product into own solution |
| | UC-NXW-1 Decision support over marketplace |

# UC-KLE-1 Maintenance Decision Support

- Forecast Motor Breakdowns of Polishing Machine



Challenge Technology Application

# UC-KLE-1 Maintenance Decision Support

- Combine Historical Breakdown Data with Vibration Sensor Data
- Vibration 0.038 m/s² data at 1.344 kHz (3 axes)


Figure 21: Bossi Motor (internal)


Figure 22: Bossi Motors (external)

Challenge | Technology | Application

# UC-KLE-1 Maintenance Decision Support

COMPOSITION DSS

- Maintenance Board
- KPIs
- Links
- Fault Diagnosis
- Personnel
- Tasks

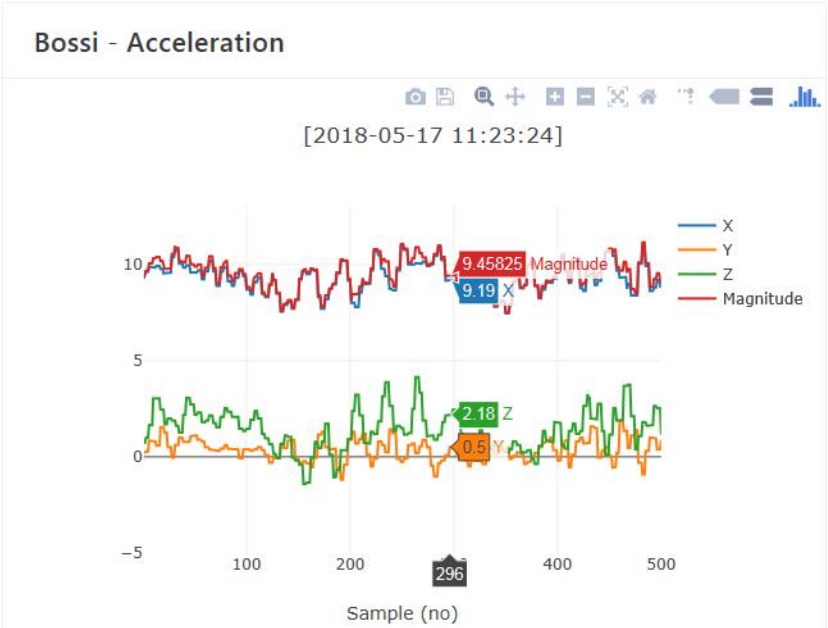
SUPPORT

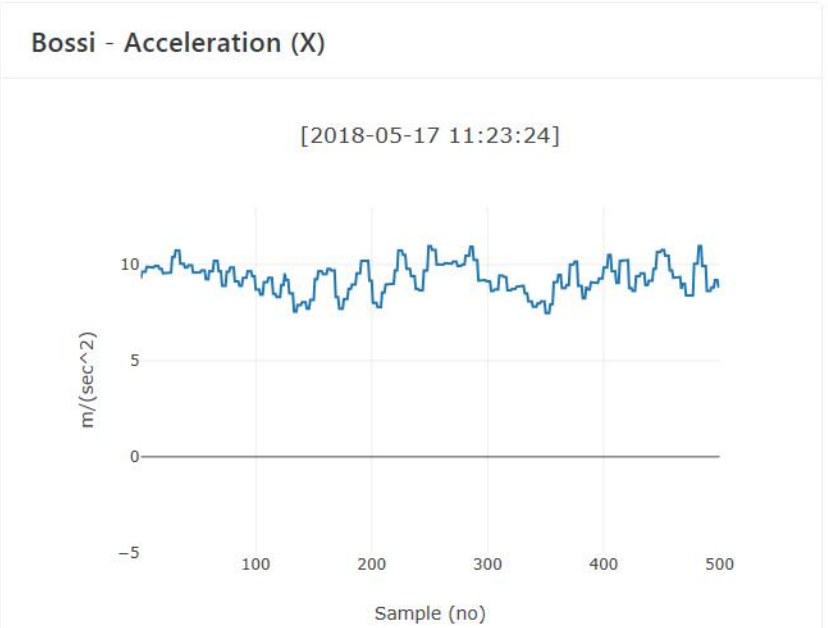
- Documentation
- COMPOSITION Project

Bossi Machine Probabilities

| Normal Operation | Mechanical Failure | Electrical Failure | Hydraulic Failure |
|---|---|---|---|
| Current Probability : 36.32% | Current Probability : 50.47% | Current Probability : 32.41% | Current Probability : 70.44% |

Vibrometer graphs




Challenge | Technology | Application

# UC-ELDIA-1: Fill-level Notification

KLEEMANN

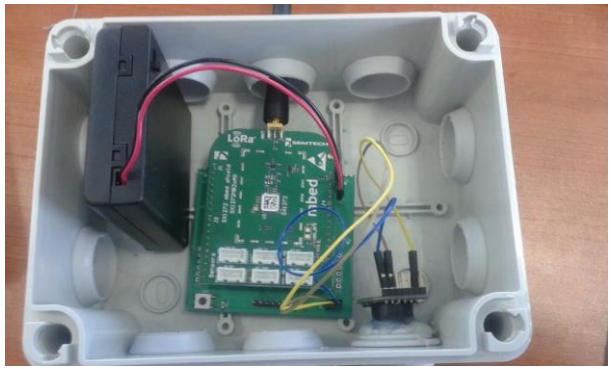
Fill-level

Send Trucks

ΕΛΔΙΑ
ΕΛΛΗΝΙΚΗ ΔΙΑΧΕΙΡΙΣΗ ΑΠΟΡΡΙΜΜΑΤΩΝ Α.Ε

Challenge | Technology | Application

# UC-ELDIA-1: Fill-level Notification



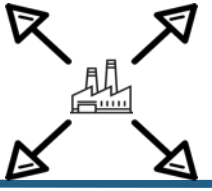
Sx1272mbas Lora communication module attached on the mcu PCB, Antenna HRLV-MaxSonar EZ (MB1043) Ultrasonic Sensor and a 4 AA Battery Pack

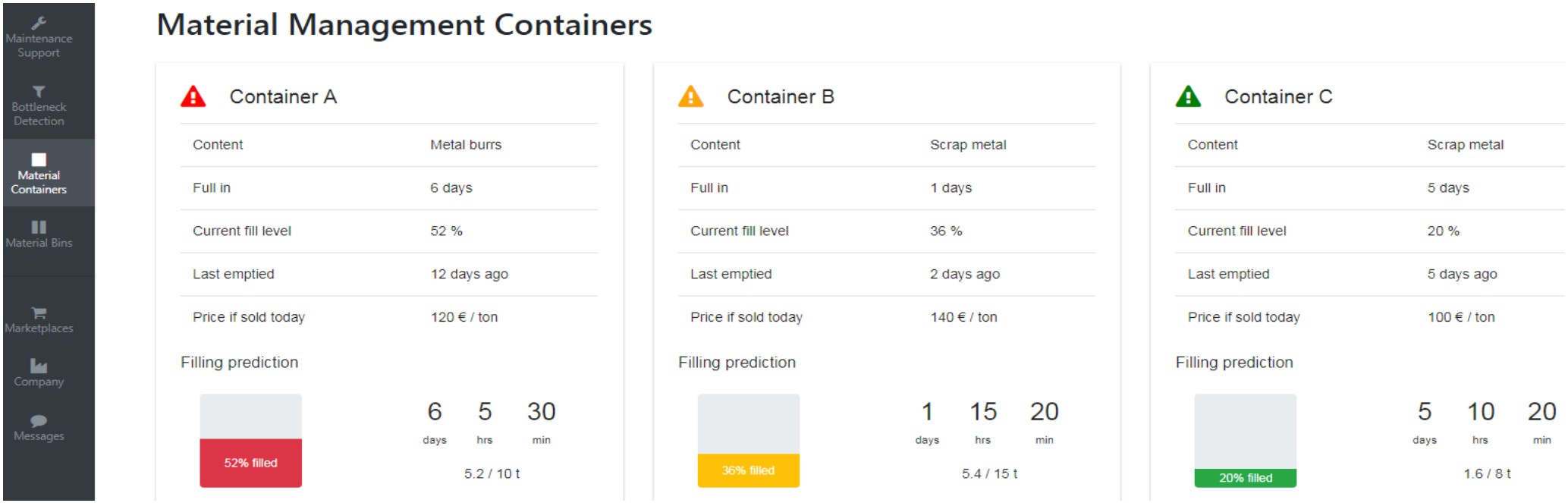
LoRa gateway access to Ethernet and power within 100m radius from the bins



Challenge | Technology | Application

# UC-ELDIA-1: Fill-level Notification

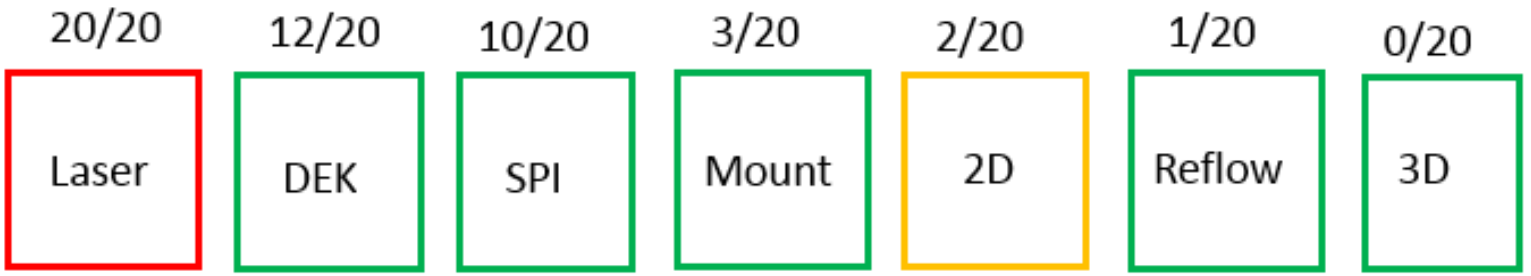





Challenge | Technology | Application

# UC-BSL-5 Equipment Monitoring and Line Visualisation

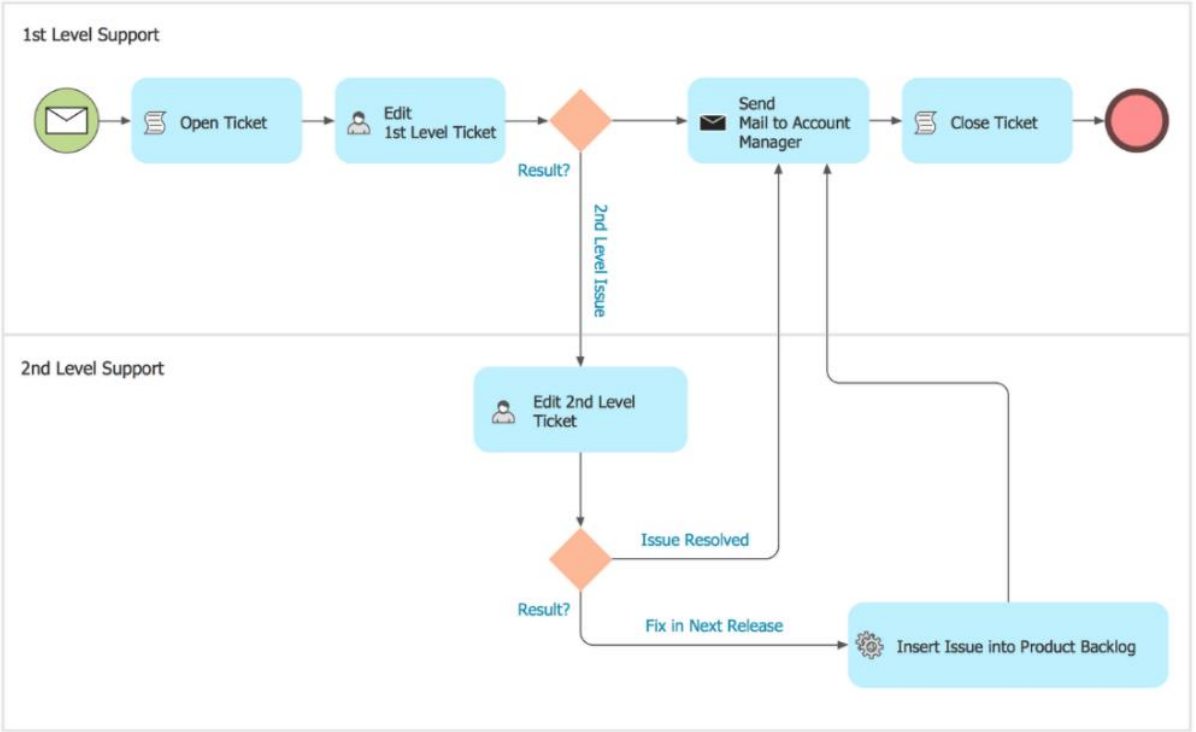
- Real time visualisation of production line's efficiency
  - Representation of Involved Equipment
  - Light Tower Equipment Status
  - Actual Production
  - Target Production




Challenge Technology Application

# UC-BSL-5 Equipment Monitoring and Line Visualisation

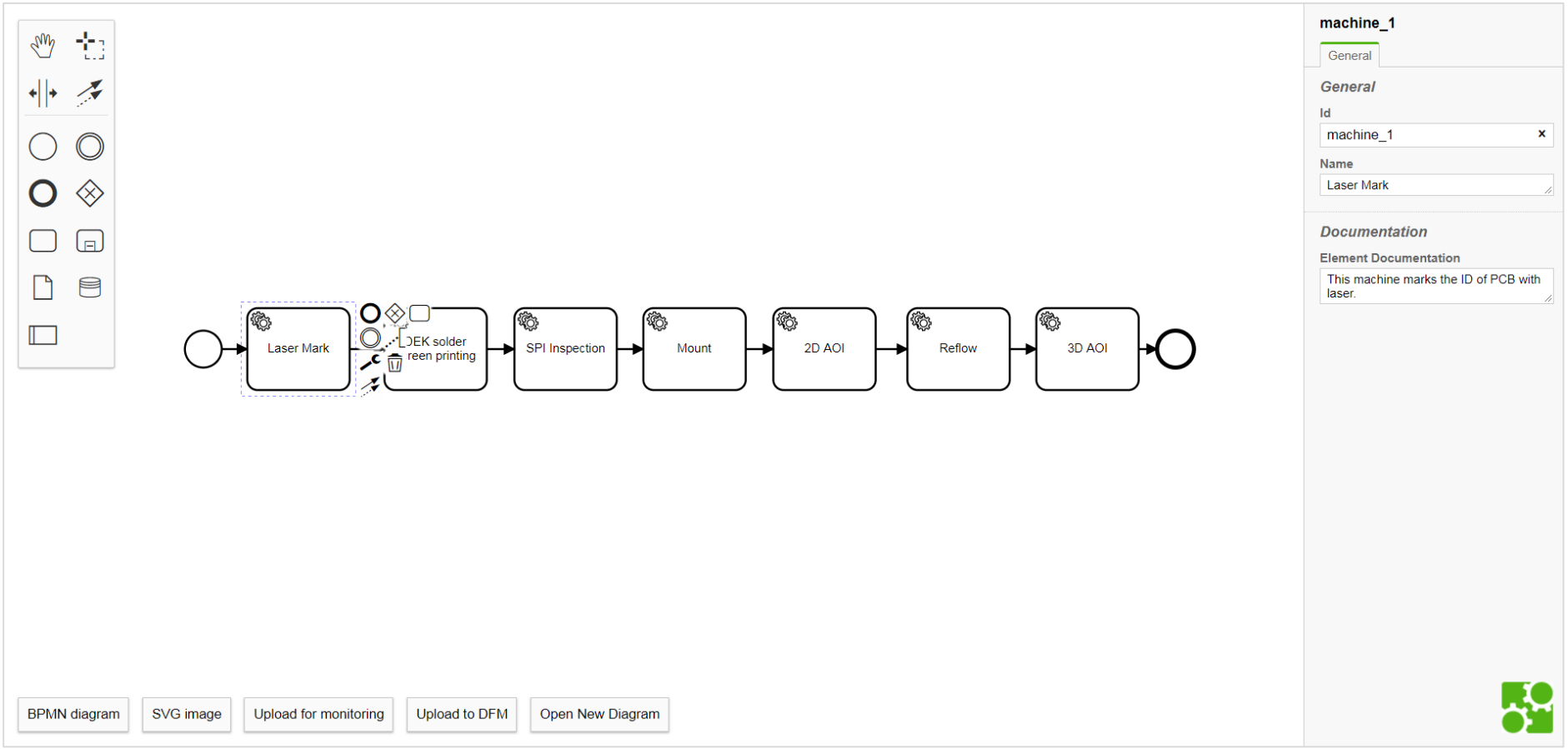
- BPMN: Business Process Model and Notation
  - Graphical Notation for Specifying Business Processes
  - Available Software Tools to Execute Logic behind a BPMN Model




Challenge | Technology | Application

# UC-BSL-5 Equipment Monitoring and Line Visualisation

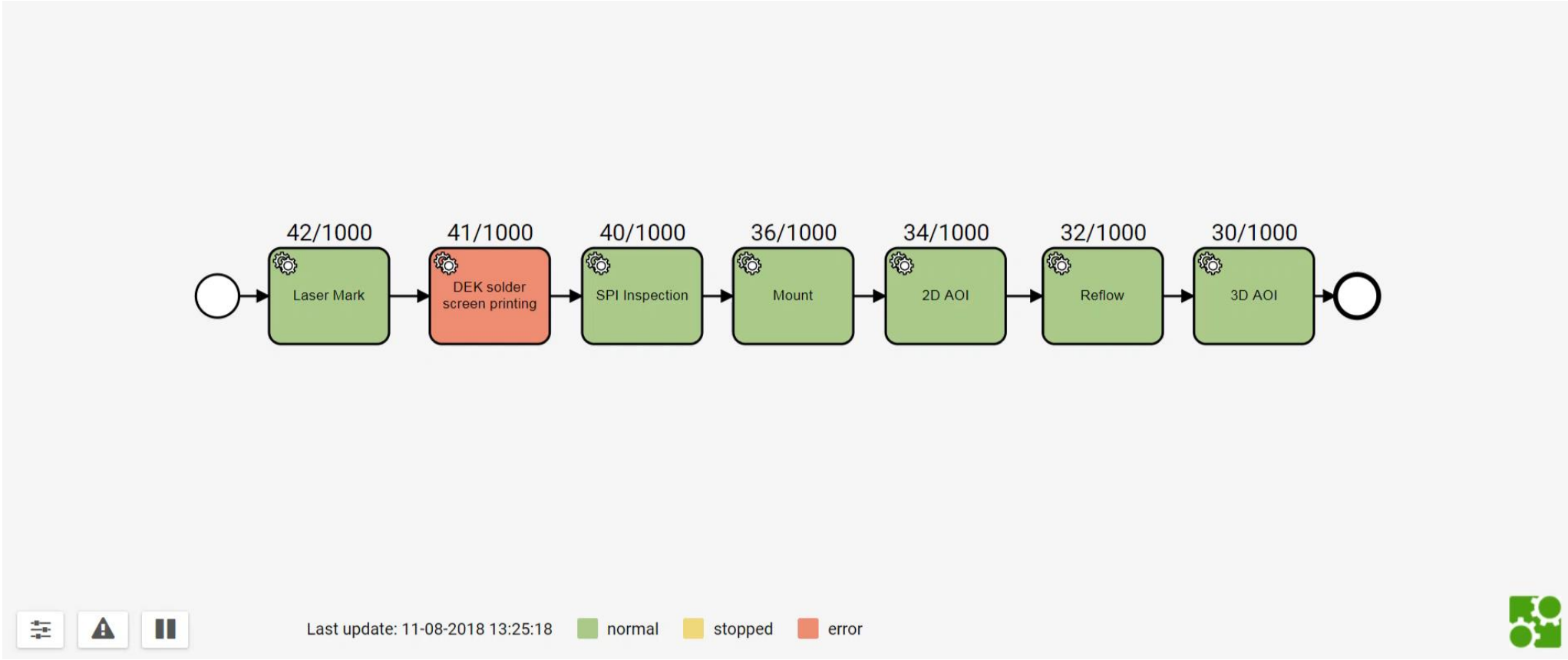
## BPMN Modeller




Challenge | Technology | Application

# UC-BSL-5 Equipment Monitoring and Line Visualisation

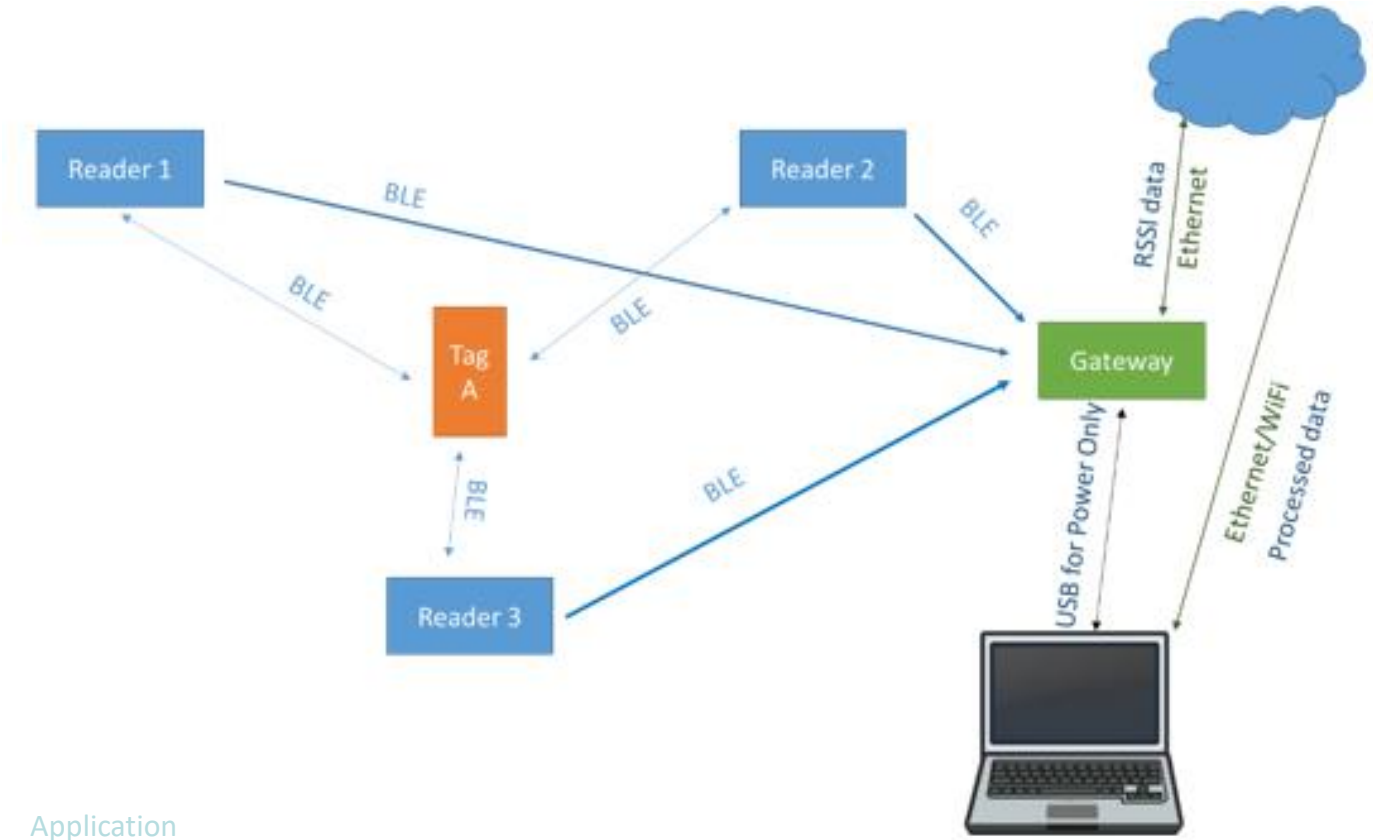
## Viewer




Challenge | Technology | Application

# UC-BSL-3 Component Tracking

- BLE Tracking System
- Proximity-based: RSSI (Received Signal Strength Indication)




Challenge | Technology | Application

# UC-BSL-3 Component Tracking


Challenge Technology Application

# Thanks for your attention



COMPOSITION has received funding from the European Union's Horizon 2020 Framework Programme for Research and Innovation under Grant Agreement No 723145.