Towards common EU Data Spaces in Manufacturing: an open source reference implementation

Big Data driven Smart Connected Factories session
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The Regulatory Context: Sharing Private Sector Data

Models to B2B Data Exchange

a) **An Open Data approach**: The data in question are made available by the data supplier to an in principle open range of (re-)users with as few restrictions as possible and against either no or very limited remuneration.

b) **Data monetization on a data marketplace**: Data monetization or trading can take place through a data marketplace as an intermediary on the basis of bilateral contracts against remuneration. Suitable when either (1) there are limited risks of illicit use of the data in question, (2) the data supplier has grounds to trusts the (re-)user, or (3) the data supplier has technical mechanisms to prevent or identify illicit use.

c) **Data exchange in a closed platform**: Data exchange may take place in a closed platform, either set up by one core player in a data sharing environment or by an independent intermediary. The data in this case may be supplied against monetary remuneration or against added-value services, provided e.g. inside the platform.
Open Data: the vision of a Didactic Factories Network

Open Data in Manufacturing

a) **Open Data Models** for SI entities (such as robots, AGVs, machines, conveyors), Data in Motion Data at Rest

b) **Network of open Didactic Factories** producing and sharing their data thanks to standard protocols and data formats (e.g. OPC-UA, MQTT, ROS, AMQP).

c) **Data Transformation techniques** for non-public Data such as Aggregation, Filtering, Anonymization, Pseudonymization.

d) **One stop shop** for search-discovery-selection, Distributed Repositories for Data Storage (iSpaces)

e) **Ecosystem of Innovators** testing and experimenting their solutions on open data (Data-AI Community)
Data Marketplaces: DIH Data Services for SMEs

- Access to Expertise
- Access to Financing
- Collaborate
- Access to Knowledge
- Access to Technology
- Find Connections

MARKET4.0
CONNECT & PRODUCE

INTERNATIONAL DATA SPACES ASSOCIATION

Production Equipment Providers (SMEs)
- Production Equipment
- Production Equipment as a Service
- Collaborative Engineering Services

Manufacturing Companies / System Integrators
- Connect
- Search
- Test / Simulate
- Compare
- Produce
- Feedback

Service / Apps Provider
- Virtual Reality Apps
- Augmented Reality Apps
- Simulation Apps
- Collaboration Apps
- IoT Apps
Trusted B2B Data Sharing: Access Sovereignty

- App Store
- Broker
- Data Source
- Data Provider
- Connector
- Data Consumer
- Data Sink
- Dataset(s) transferred from Provider to Consumer
- Metadata Description of Datasets/Provider/Consumer
- Application for specific data manipulation

Data exchange (active)
Data exchange (inactive)
Metadata exchange
App download

Inter-Site Databus
Site Databus
Unit Databus
Machine Databus
Think
Sense
Act
HMI

Boost 4.0
BIG DATA FOR FACTORIES

INTERNATIONAL DATA SPACES ASSOCIATION

industrial internet CONSORTIUM
Predictive Maintenance in FIAT Welding Line in Melfi

**FIAT Campus Melfi** innovative welding station composed by equipment of different manufacturers, including **PRIMA Laser Welding Machine** and multiple Mobile Robotics (AGVs) internal logistics systems.

Implementing a “powered by FIWARE” multi-stakeholder Industrial Data Space in **SIEMENS MINDSPHERE** IoT Platform, under **POLIMI** methodology for Industry 4.0 6Ps Digital Transformation of Manufacturing.

An **IDSA** Data Sovereignty reference implementation based on configurable and flexible integration of **Orion Context Broker** with Big Data AI-based **MINDAPPs** for Predictive Maintenance.

**MindSphere World Italia** experimental Facility (end 2019)

**BUSINESS IMPACT**

1. No cycle time for part downloading
2. Increasing productivity: more than 14% of time saving
3. No fixed clamping system. The machine could be used to cut different part numbers
4. Using the same machine for different body car parts.
5. Working tolerances measured & certified towards a Zero Defect Manufacturing welding station
FIWARE-MINDSPHERE bridge

FIWARE Data Model
1. Industrial IOT
2. Enterprise Systems
3. Context
4. Scope

OPC UA

Results to be used in production environment

3 BOOST Mindsphere apps
Core Mindsphere app

Context-driven Data Models
Mindsphere Data Models

Manufacturing Execution System
SCADA AGV
SCADA System

ERP
AGV
Laser Machine

Trusted B2B Data Sharing: Usage Sovereignty

Datensouveränität im Internet der Dinge – Der Trusted Connector im Industrial Data Space

Technical Enforcement

Organizational/Legal enforcement
WHIRLPOOL Big Data Results Data Sharing

Output 1:
- Space Parts Demand Forecast in City

Output 4:
- Quality Reports for:
  - Factory and Product Engineers
  - Market and Service Partners Training
  - Smart Appliance Predictive Maintenance Approach

NEW PREDICTION TOOL (2023-2024)
[In parallel with the current statistical demand forecast generation]

App Store

Broker

Data Source

Connector

Data Provider

Data Consumer

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