



# **Evolving the Knowledge Spiral: Integrating Sensor Data Analysis and Semantic Information in IoT and Industrie 4.0**

Impulse for Cooperation Projects between Germany and Japan

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# Project Anakonda: Semantic Sensor Data in an Urban Setting



**World**

Measure

**Sensor**

Represent

Interpret



*Time,  
Geo Data,  
Context,  
etc.*

**Background Knowledge**

*Lines, Time,  
Stops*



*Stops,  
Geo Data*

*Real world scenarios comprise different types of data, information, and knowledge.*

# Also Industrie 4.0 Can Benefit from Semantic Knowledge



**World**

Measure

**Sensor**

Represent

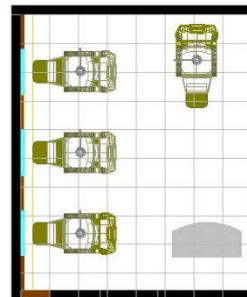
Interpret



*Sound,  
acceleration, ...,  
context, etc.*

**Background Knowledge**

*Shop floor layout,  
work piece model,  
sensor networks, ...*



*Expert experience,  
e.g., on processes,  
failure, quality, ...*

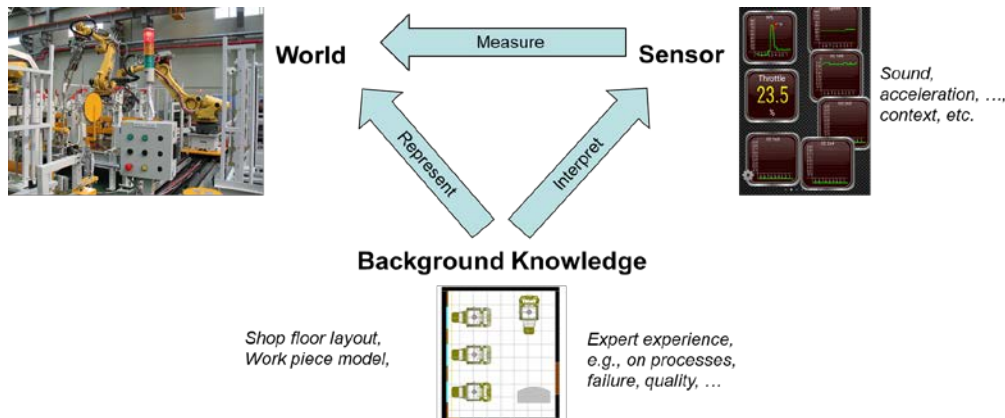
*Currently, knowledge is often “buried” in the sensor data analysis code.*



- *Short-term* (tactical) and *long-term* (strategical) exploitation of sensor data

- How can background knowledge be used to help *interpreting sensor data*?

- for better automatic results
- for human-understandable results



- How can sensor data analysis be used to *evolve* (partial) *knowledge models*?

# Leveraging Complementary Strengths: Dimensions of Collaboration



- Joint **use cases**, e.g.:
  - Predictive maintenance in production
  - Smart processes on the shop floor
- Joint **research questions**, e.g.:
  - Machine learning for sensor data analysis
  - Explainable of deep neural networks
  - Integration of expert knowledge
  - Management of sensor network data
- Joint (experimental) **data**
- Developing and committing to **standards**
  - along the stages of innovation
- Bringing **people** together
  - Never underestimate the power of physical collaboration!



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