PREDICTIVE MAINTENANCE
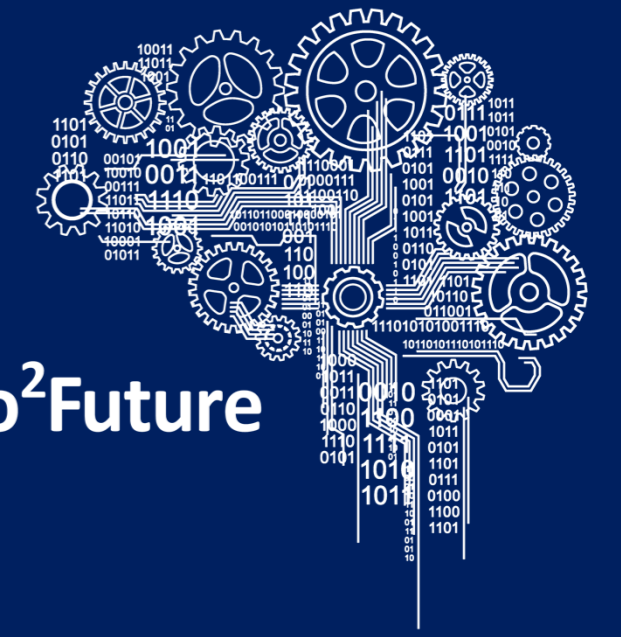
Maintenance Event Detection
based on time-series data of welding devices

Pro²Future

Milot Gashi[1], Heimo Gursch[2], Stefan Thalmann[3]

Pro2Future GmbH[1], Know-Center GmbH[2], KFU-BANDAS (Business Analytics and Data Science-Center)[3]
[1] Pro2Future GmbH, Infeldgasse 25F, 8010 Graz
[2] Know-Center GmbH, Infeldgasse 13/6, 8010 Graz
[3] University of Graz, Universitätsstraße 15, Bauteil F/III, 8010 Graz

MOTIVATION & GOALS

Fronius offers a large portfolio of **welding devices** to customers all over the world. The large number of welding products' variants and options in combination with the **different operating conditions** at the customers of Fronius, makes it challenging to determine **ideal maintenance times**. Thus, current maintenance strategies are often cost intensive for the manufacturers using the devices and cumbersome for the maintenance workers. This project aims **at automatically determining ideal maintenance times** to:

- Provide cognitive **decision support** for welding workers
- **Predict** required **maintenance** based on past maintenance actions
- **Reduce and focus** maintenance **efforts**

Project FactBox

Project Name	ZEWAS
Project ID	MFP II 3.3.1
Duration	9 Months
Area 3	
Cognitive Decision Making	
Project Lead	
DI Heimo Gursch	

APPROACH

Inputs
- Sensor data describing the welds over time
- Past maintenance logs

Challenge
- Maintenance logs are incomplete or missing

Outcome
- Learn to identify of maintenance needs from incomplete training data
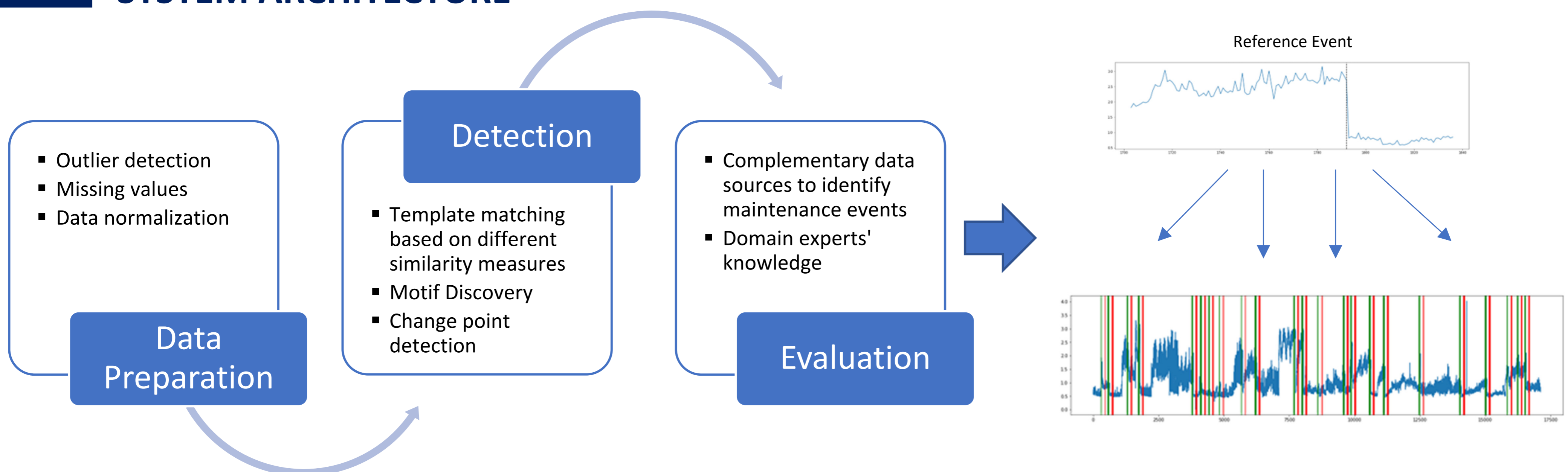
CONTRIBUTION

Scientific contribution
- "Cognitive Decision Support for Industrial Product Life Cycles: A Position Paper" - COGNITIVE 2019
- "Taking Complexity into account: A structured literature review on multi-component systems in the context of predictive maintenance" - EMCIS 2019
- "Dealing with missing usage data in defect prediction: A case study of a welding supplier" - Computers in Industry

Economic contribution
Improved Welding Quality and welding products leading to better products, higher reliability, less costs, better performance of workers due to decision support

SYSTEM ARCHITECTURE

- Outlier detection
- Missing values
- Data normalization

Data Preparation

- Template matching based on different similarity measures
- Motif Discovery
- Change point detection

Detection

- Complementary data sources to identify maintenance events
- Domain experts' knowledge

Evaluation

Reference Event