

1. Introduction

The following work will give a short overview demonstrating the generality of AI. The background is given for four examples, one soft science and three hard science industrial applications with regard to PDM. Besides the methods, the results are given for the four examples, a learning media platform, a shaft sealing of a storage pump, the cybernetics of a tunnel ventilation shaft system and a milling machine quality decision making. Finally the conclusions for all the examples are given as well as follow up studies in the field of AI.

2. Methods

- (1) Logical analysis
- (2) Dynamic statistical data analysis
- (3) Machine learning tools

3. Learning Media Platform

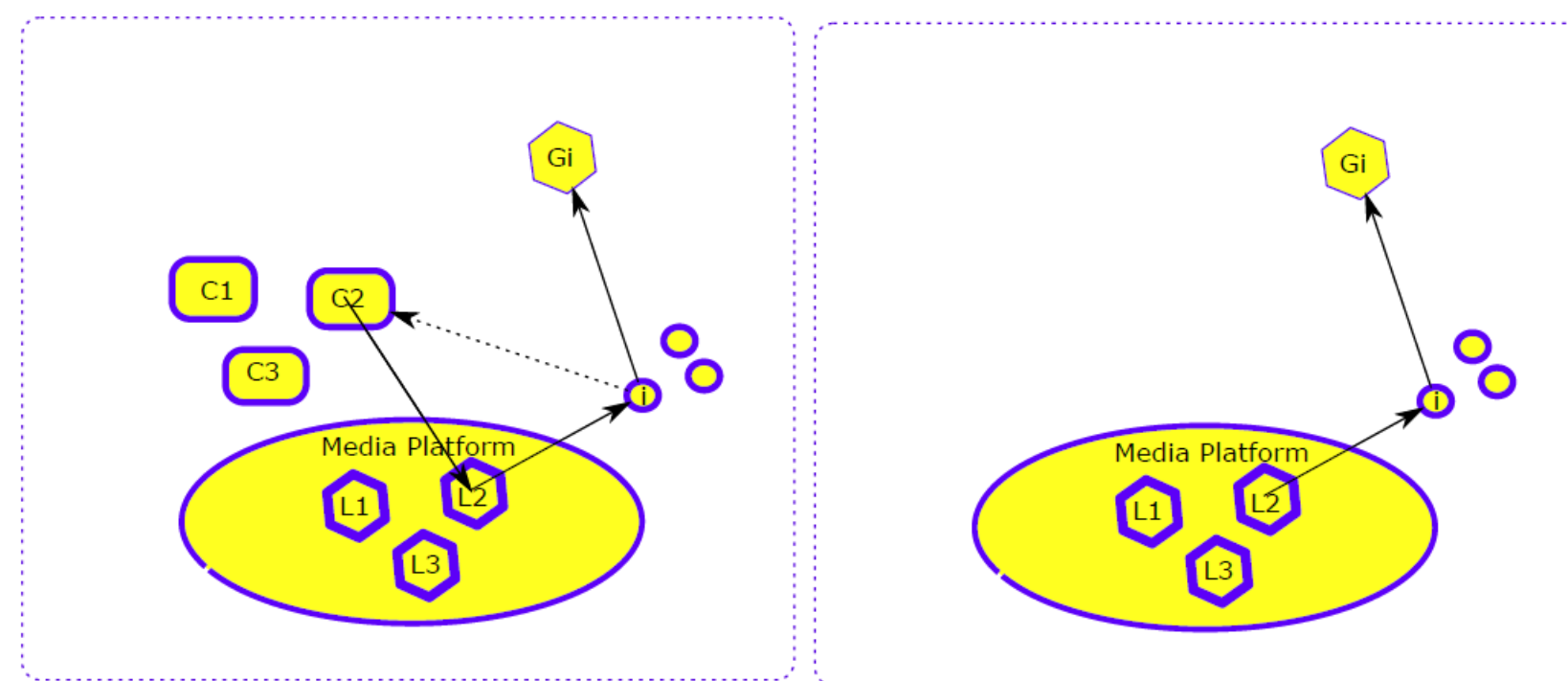


Figure 1. Learning Media Platform (LMP) Left: Company aligned with companies C1,C2..Cn; the individual is divided by two goals - his own goal Gi and the companies goal C1..Cn Right: A company intention free Learning Media Platform (LMP) - The individual i can focus directly on his "deep" goals Gi

4. Shaft Sealing of a Storage Pump

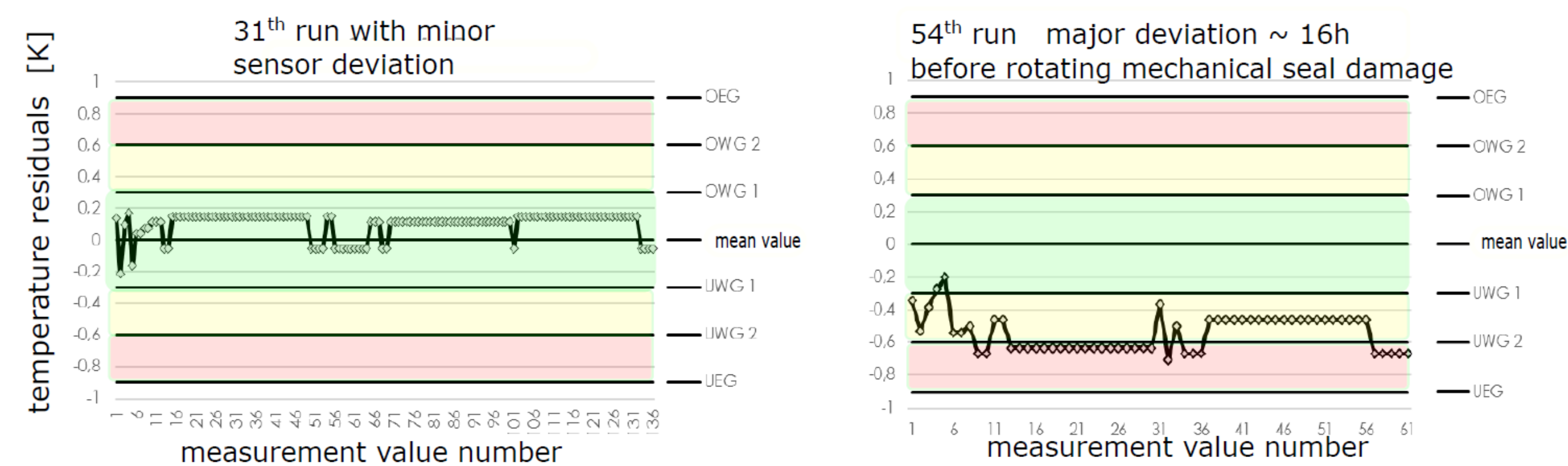


Figure 2. The picture in the left side shows the temperature signal residuals of a pump run with minor deviation. On the right side, the residuals approximately 16 hours before the damage are shown. This characteristic shall be used for future rotating seal inspection [1]

5. Cybernetics of a Tunnel Ventilation Shaft System

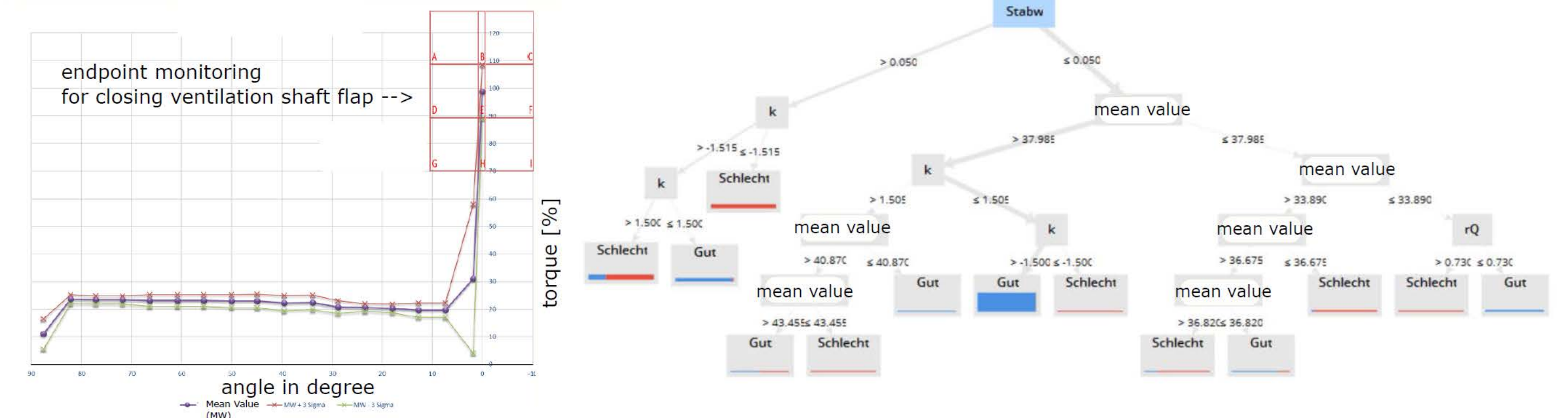


Figure 3. Left: Band gap of standard deviations for the two control parameters angle and torque - normal operation of one tunnel shaft ventilation control system Right: Decision tree for the machine learning algorithms of the milling machine application [1]

6. Conclusion

- In general decisions can increase order. This is true for social systems like a LMP, where the total order increases highly, which was made plausible with a thought experiment, when the goal is redirected to the self, leading to *potential self organisational order growth*.
- A common feature of the above shown industrial approaches is the necessity of identification of *damage relevant process changes*.
- The procedures of predictive control are related to AI as AIA, as they implement a *feedback system* by means of *relevant process data* in a *coordinated feed back loop*. This also leads to an *information density increased system* - this means that the same *self organisationally controlled* or *AIA system* is more intelligent regarding to PDM, leading to better decision results and hence economic benefit.
- A *strong coupling of process-/data analysis knowledge - based on high data quality* - is essential for the success of an implementation of plant/process condition assessment systems (compare also [2]).

7. Follow Up Studies

- AI-studies for SME's
- *Potential predictive legislation development* in the context of the *orgiton theory* (q.v. [3])

Literature

- [1] T. Obermueller, C. Loipold and W. Wissounig. *Predictive Maintenance - Concept for Plant Assessment (in German)*. Bachelor Thesis I, Carinthia University of Applied Sciences (CUAS), Villach, 2019
- [2] J.T. McCoy and L. Auret. *Machine Learning Applications in Minerals Processing: A Review*. In: Minerals Engineering 132 (2019), pp. 95-109.
- [3] B. Heiden, B. Tonino-Heiden, W. Wissounig, P. Nicolay, M. Roth, S. Walder, X. Mingxing and W. Maat. *Orgiton Theory: in preparation* (2019)