Paris Session 2022

Improving Condition-based Maintenance through Cooperative Data & Insights Partnerships

SC B3 – Substations and electrical installations

PS 3 – Integration of Intelligence on Substations

Question 1 – Benefits and acceptance of IoT-based solutions

Marcus ZELLER, Uwe HUBERTH, Maria KOSSE (Germany)

SIEMENS energy

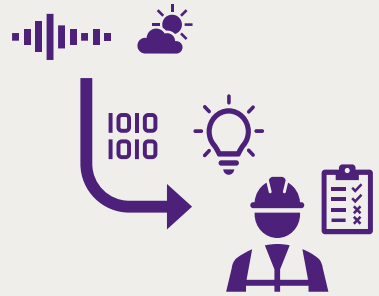
Benefits of Digital Solutions for Customers

What can be expected in short- & long-term perspective?

- **Increased Transparency (short-term):**
  - Additional information on real-life equipment condition (e.g. DGA, temperature, pressures)
  - Non-critical for stable operational safety (→ C&P!), but for assessing equipment "health"

"**Sensors for Condition Monitoring (CM)** do not serve a purpose of their own, but **have to provide tangible added-value** for Operators/TSOs"

- **Improved Service Operations (long-term):**



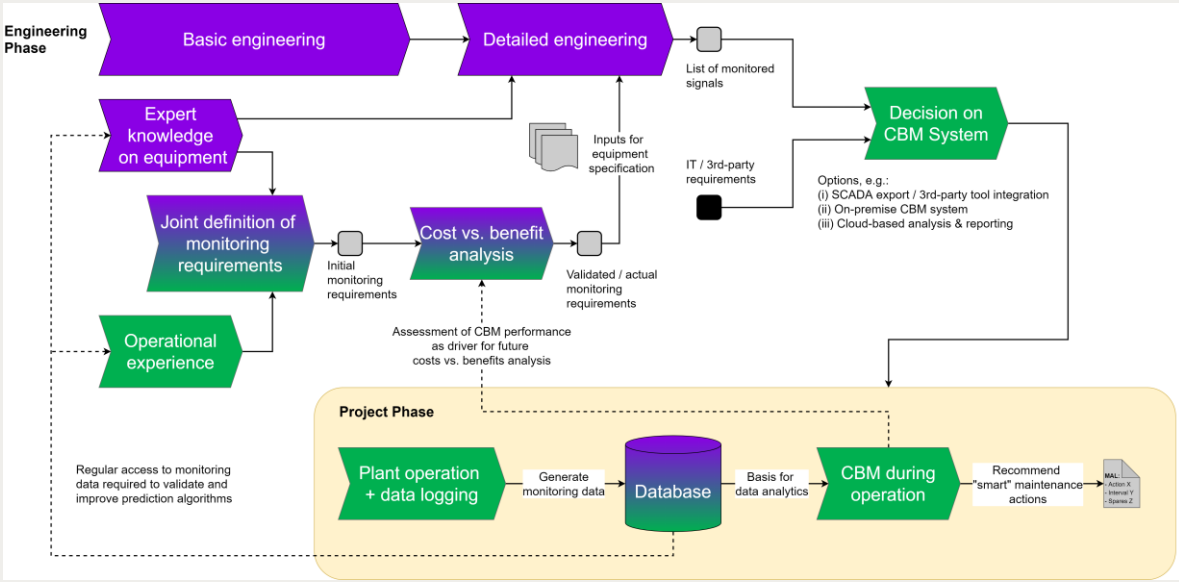
1. Pre-warnings on arising issues & required actions
2. Enhanced spare parts management
3. Minimization of down-times
4. Extension of maintenance intervals & equipment lifetime
5. Savings on overall lifecycle costs (esp. OPEX for remote, unmanned stations)

→ (digitally supported) **Condition-based Maintenance**

Cooperative Approach from Planning to Operation

Fostering continuous learning for solution providers & TSOs

- **Joint Iterations during Project Phases:**
  - Definition of requirements & cost-vs-benefit considerations (e.g. FMECA and RAM analyses)
  - No absolute "standard"
    → solution will be tailored to specific plant & project
  - Decision on CBM system, data storage & usage
  - Collection & sharing of CM data data throughout station's lifetime



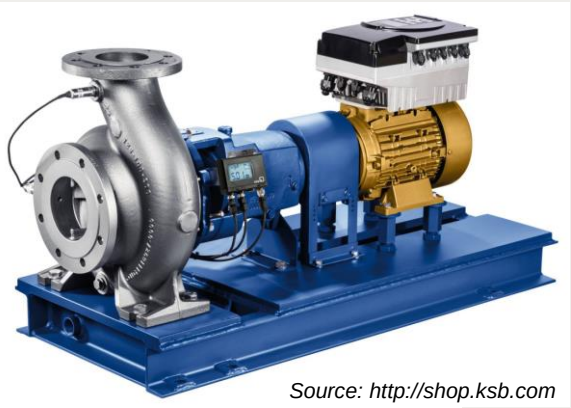
- **How to push acceptance of digital solutions?**
  - Collaboration projects on specific use cases are essential → provide same view on issues for EPCs & TSOs
  - Acceptance will ultimately depend on "usefulness" of data → ability to predict future behaviour (e.g. avoiding outages)
  - "On-premise" solutions often still preferred → related IT security concerns have to be respected

Establishing "Data & Insights Partnerships"

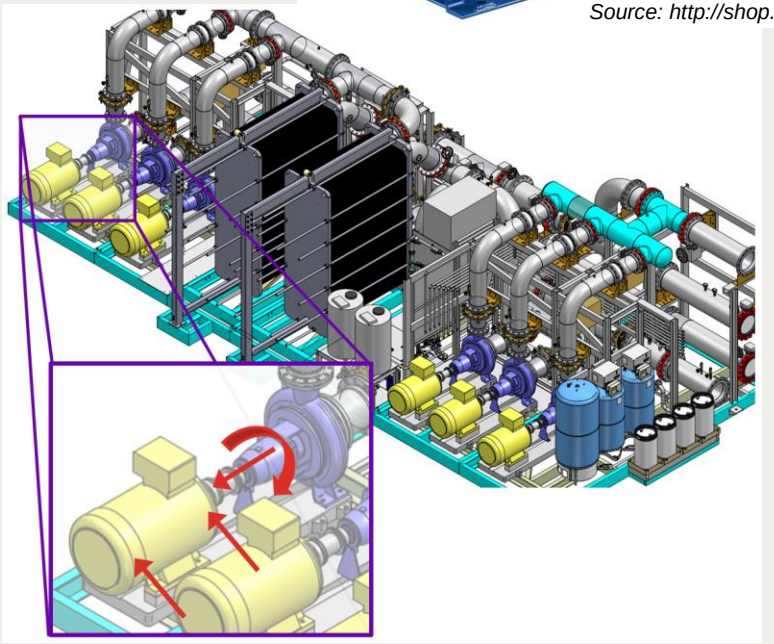
Example for pilot project on pump vibrations monitoring

- **Project Setup:**
  - Partnering w/ one of Europe's leading TSOs
  - Retrofit of existing substation's cooling system pumps (~ years of operation) by vibration sensors (IEPE accelerometers)
  - High-resolution & processed monitoring data, accessible to both partners
  - Trustful atmosphere and close cooperation (backed by NDA)

- **Goals & Status:**
  - Improve insight into data by analyses (e.g. RMS, FFT over time etc)
  - Ongoing exchange of experts from both sides (workshops)
  - Pre-testing & installation in progress…



Source: http://shop.ksb.com



"**Sharing data** from condition monitoring **enables a joint learning** and subsequent **benefits for both parties**"

→ Actual field data is equally important for EPCs/OEMs to validate assumptions on design & operational performance!