

Big data: preventive maintenance

Stella Kapodistria

Joint work with

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BMW: Condition based service



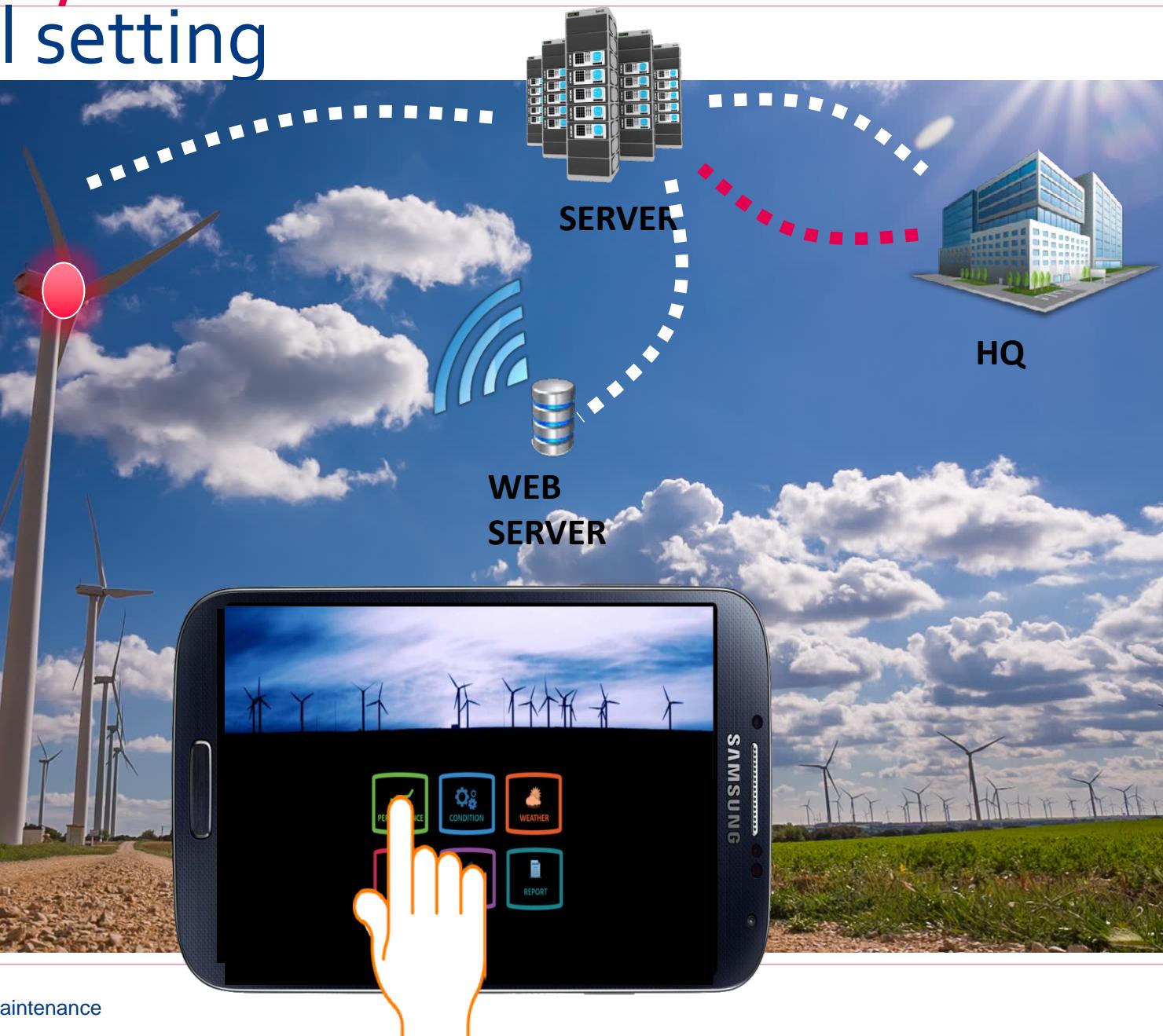
The benefits at a glance

- Only maintenance when necessary
- BMW contacts you when maintenance is needed
- Quick and precise remote diagnosis
- Remote maintenance for certain failures
- Does not store personal data

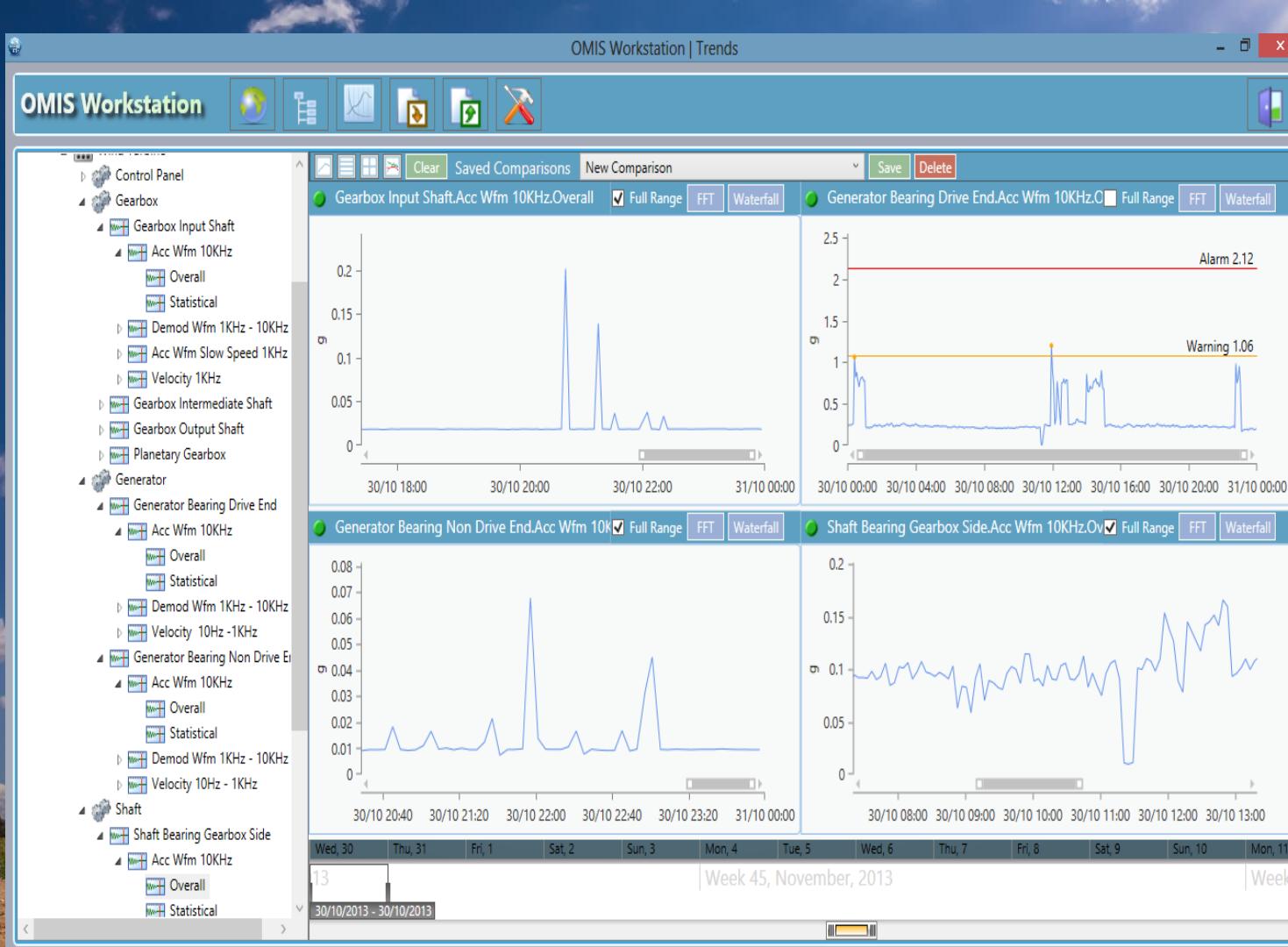


Use case 1: DAISY & DAISY4offshore

Industrial setting



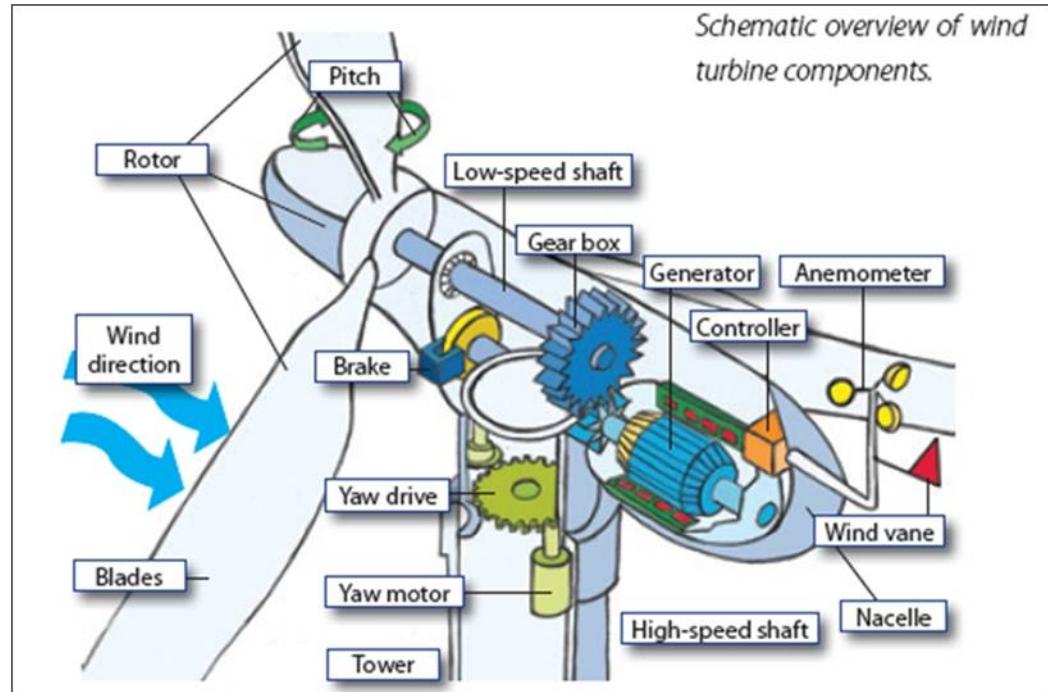
Industrial setting



Problem statement

Data:

- Component condition
 - Temperature
 - Vibration
- Speed
- Pitch angle
- Yaw
- Operating state
- Power output
- Environmental conditions
- Event & maintenance logs



Data from every turbine :

$$3\text{GB per day} * 365 \text{ days} = 1.095\text{TB per year}$$

Objectives:

Monitoring, prognostics, and diagnostics of wind turbines
Condition based maintenance

Wind turbine generator condition-based maintenance

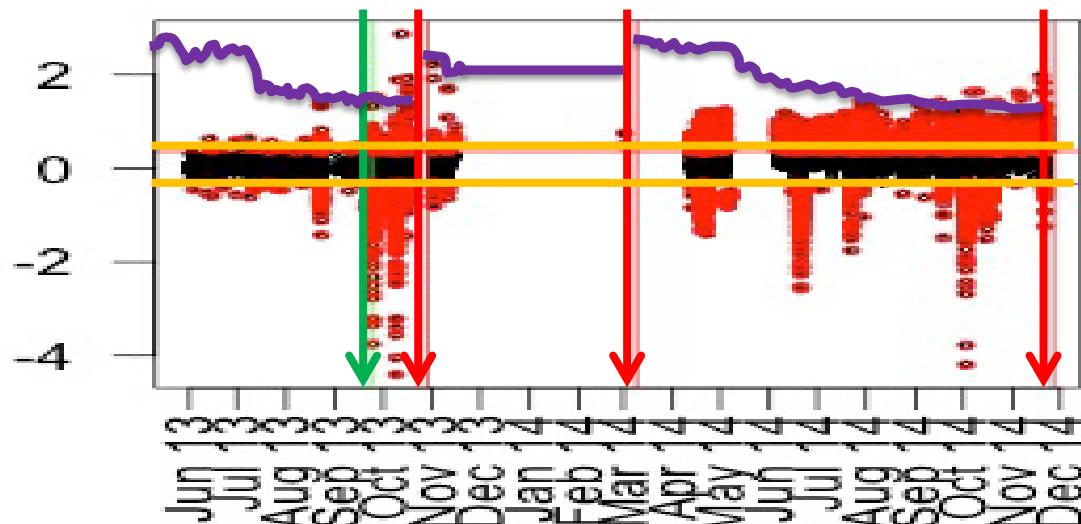
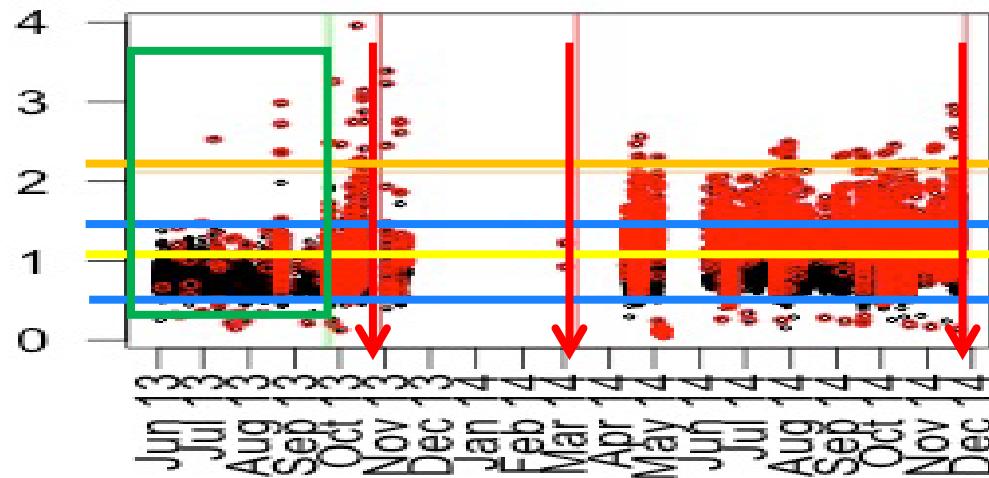
Step 1: Identify baseline period (19 June 2013 – 18 Oct 2013)

Step 2: Only look at main generator operating & connected

Step 3: Build an algorithm considering all available relevant data **that corrects for external factors**

Step 4: Define simple effective policies, without knowledge on the failure times

Generator vibrations over time





Use case 2: Healthcare systems

Preventive maintenance

Data:

- Replacement calendar times
- Usage values

Assumptions:

- Replacement = “failure”

Steps:

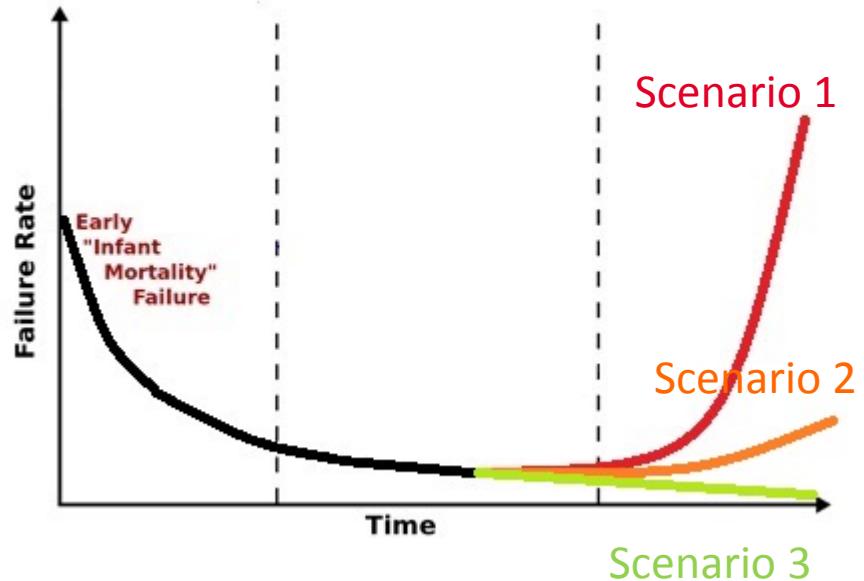
- Identified the relevant usage value
- Distinguished between heavy and non-heavy usage

Objective:

Decide when it is optimal to perform maintenance

Results:

- Predict the calendar time till “failure”
- Tool for maintenance decision making, under various scenarios and according to usage



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