



ADQM

Automatic Quality Analysis of Vessel & Fleet Data



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ADQM

Automatic Data Quality Management

The Vessel Data Problem

In modern vessels, 1000s of signals are collected onboard, transferred ashore or to the cloud and stored

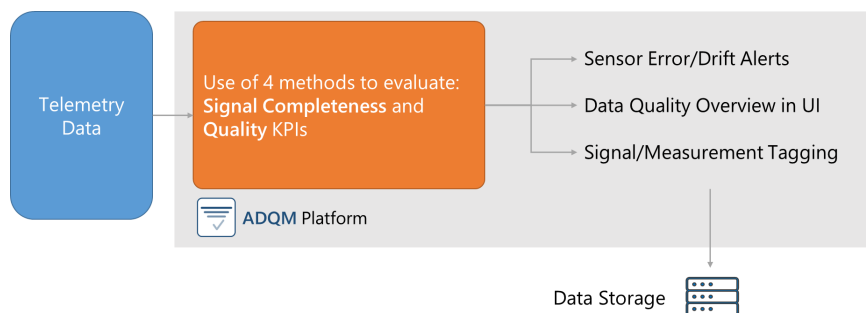
Sensor errors and drift can reduce the quality of stored data, resulting in:

- Reduction of high quality data availability
- Increase in time/cost for data analysis
- Increase in data storage costs for unusable data

The ADQM Solution

We take all telemetry data and we use four methods to evaluate the:

- **Signal Completeness**
- **Signal Quality**



Using this process :

- We can output alerts for sensors or signals that have a problem, so that they are checked immediately
- We can output a data quality overview for a system, a vessel or a whole fleet using a simple UI
- We can tag the measurements, so that in any later postprocessing periods with bad quality or completeness can be omitted without looking again through the data

Our 4 Methods for Data Evaluation

1 Initial

At first we use simple minimum and maximum limits for each signal and check the data completeness.

2 Engineering (rulesets)

Then we use physical rulesets which dictate the relationship between signals. For instance in the pressure measured in a pipe with fuel flow, the pressure upstream should always be higher than downstream. If not there is an indication of a problem, and the reported KPI drops.

3 Statistical

Here, we check each signal is checked for long-term deviations (sensor drift or bias) compared to its value in the past.

4 Machine Learning

Finally, machine learning is used for data validation of multiple parameters (outlier detection) and for data prediction (Data imputation).



Our four methods above produce a final KPI for each signal, system, vessel or fleet .

$$\text{Vessel KPI} = \frac{\text{Completeness} + \text{Quality}}{2}$$

Completeness: Informs user about the fullness of received data stream (Received vs Expected)

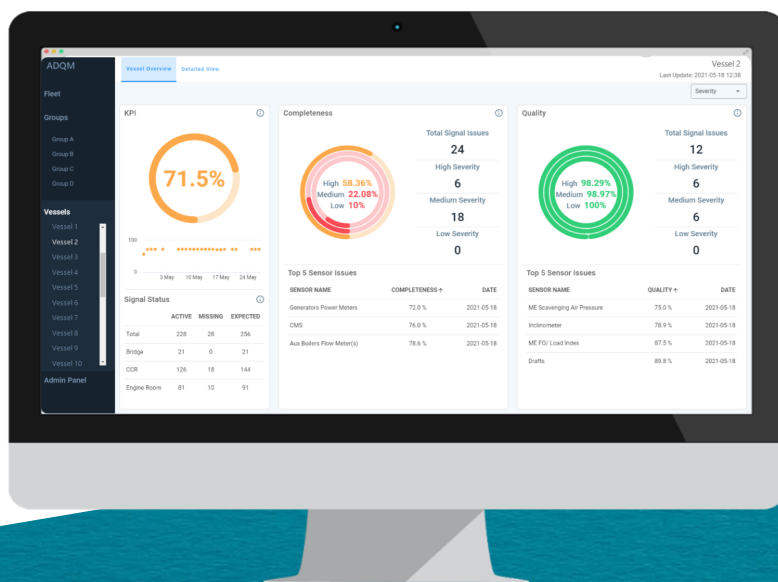
Quality: Aggregation of all method's results on received data stream



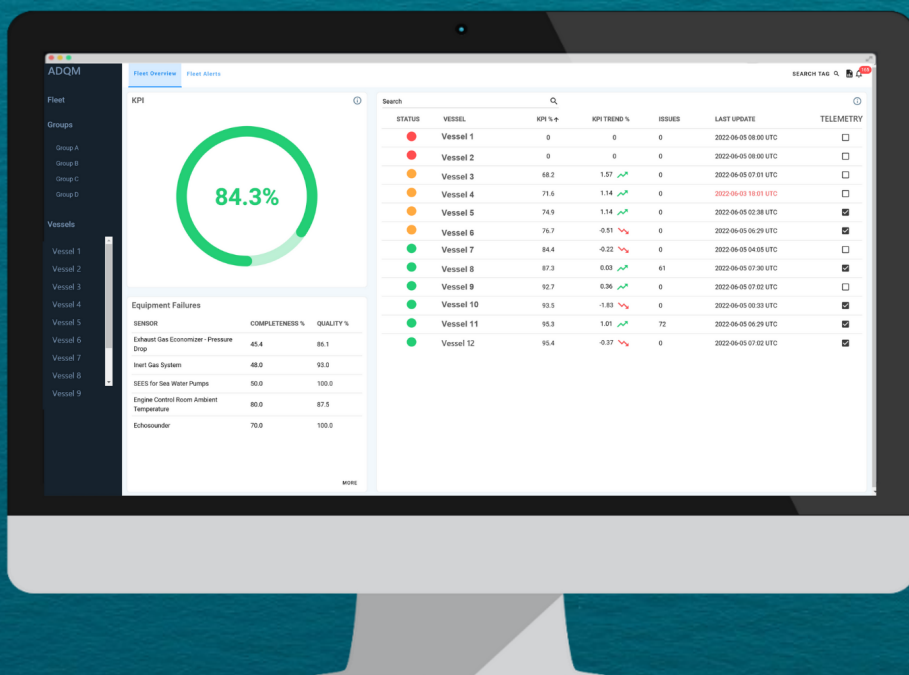
ADQM

Uses Smart Data Evaluation to ensure:

- Immediate identification and alerting of sensor errors
- Simple overview of fleet data quality
- Evaluation and tagging of data quality for further use



This enables shipping company to improve data quality and reduce data evaluation time and effort.





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