BLUE INNOSHIP: VESSEL PERFORMANCE DECISION SUPPORT

Tanker Operator Athens May 3 2017

A performance management project developed with J Lauritzen and Torm

Vessel Performance Solutions™

INNOPLUS: VESSEL PERFORMANCE DECISION SUPPORT

- Energy Efficiency
- KPI Framework
- Open standard for exchange of Performance Data

Initiated on 1 April 2015

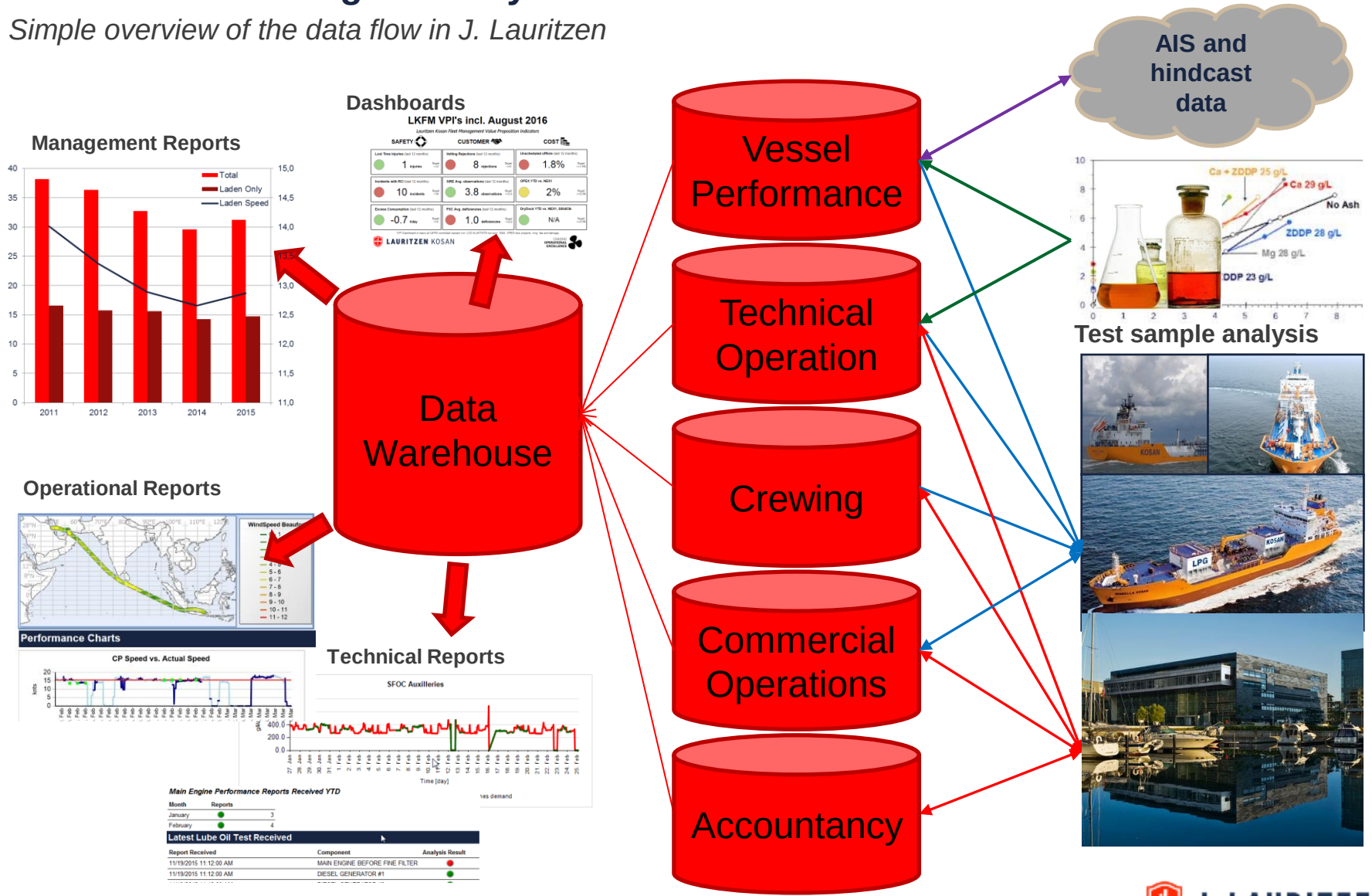
Den Danske Maritime Fond
Orient Fond

- Lauritzen Kosan
  - Ship-owner
    - Own vessels, Joint ventures, Bare Boat and Time Charter, Pool Partners
  - Operates 32 LPG carriers from Copenhagen and Singapore
    - Commercial Pool of Ethylene carriers
  - Technical Management of 27 LPG carriers from Copenhagen
  - Bunkered 110.000 ton fuel 2016

- Lauritzen Bulkers
  - Owned, but mostly Time Chartered vessels: Supramax and Handysize
  - Operates 87 bulkers from Copenhagen, Singapore and Stamford USA
  - Technical Management outsourced
  - Bunkered 405.000 ton fuel in 2016

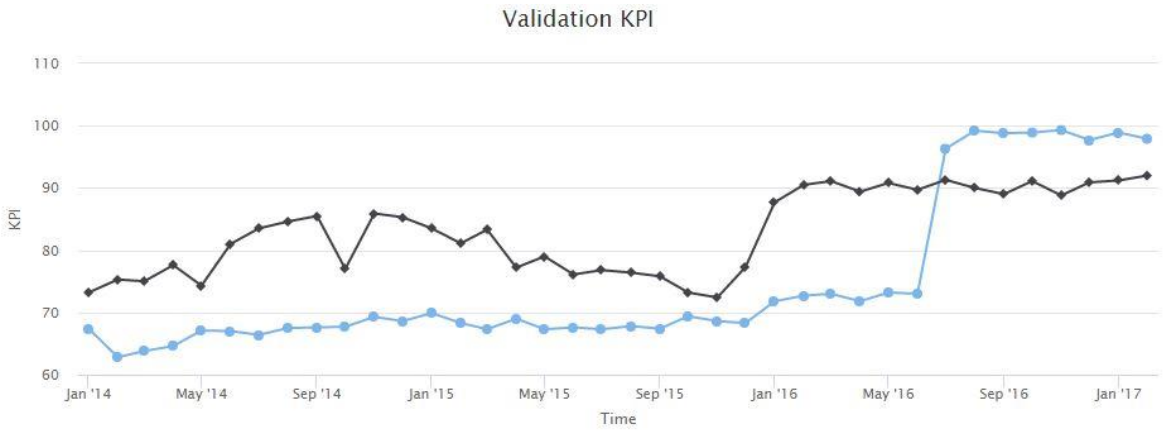
Performance Management System

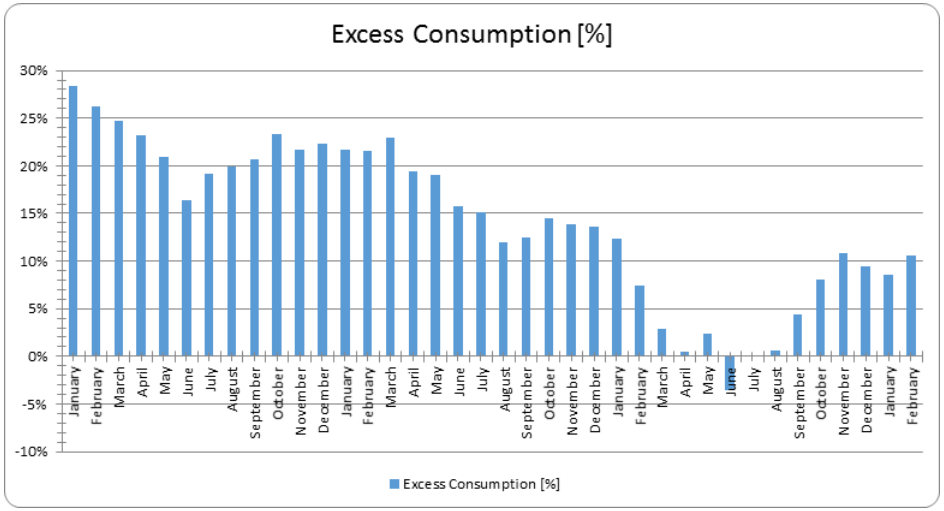
Simple overview of the data flow in J. Lauritzen



Trending of Vessel Performance

Based on Vessel Performance Analysis engine developed under Blue INNOship Project #5: "Vessel Performance Decision Support"





MOTIVATION: BIG DATA AND INTERNET OF THINGS

Shipping companies with an IT strategy wish to combine different expert systems into their own system.

The future of big data and IoT lies in how different expert systems can communicate between each other.

Torm and Lauritzen existing strong performance departments: knowledge and ressources.

Idea to team up with experts and develop a system together in a modular structure to be able to interface to other BI solutions.

Shipping companies wish to have freedom to maneouvr

Open standard for exchange of performance data

PERFORMANCE MONITORING SYSTEM: KEY ELEMENTS

Data collection:
Noon or autolog (many solutions!)
Quality of data
Communication vessel/office

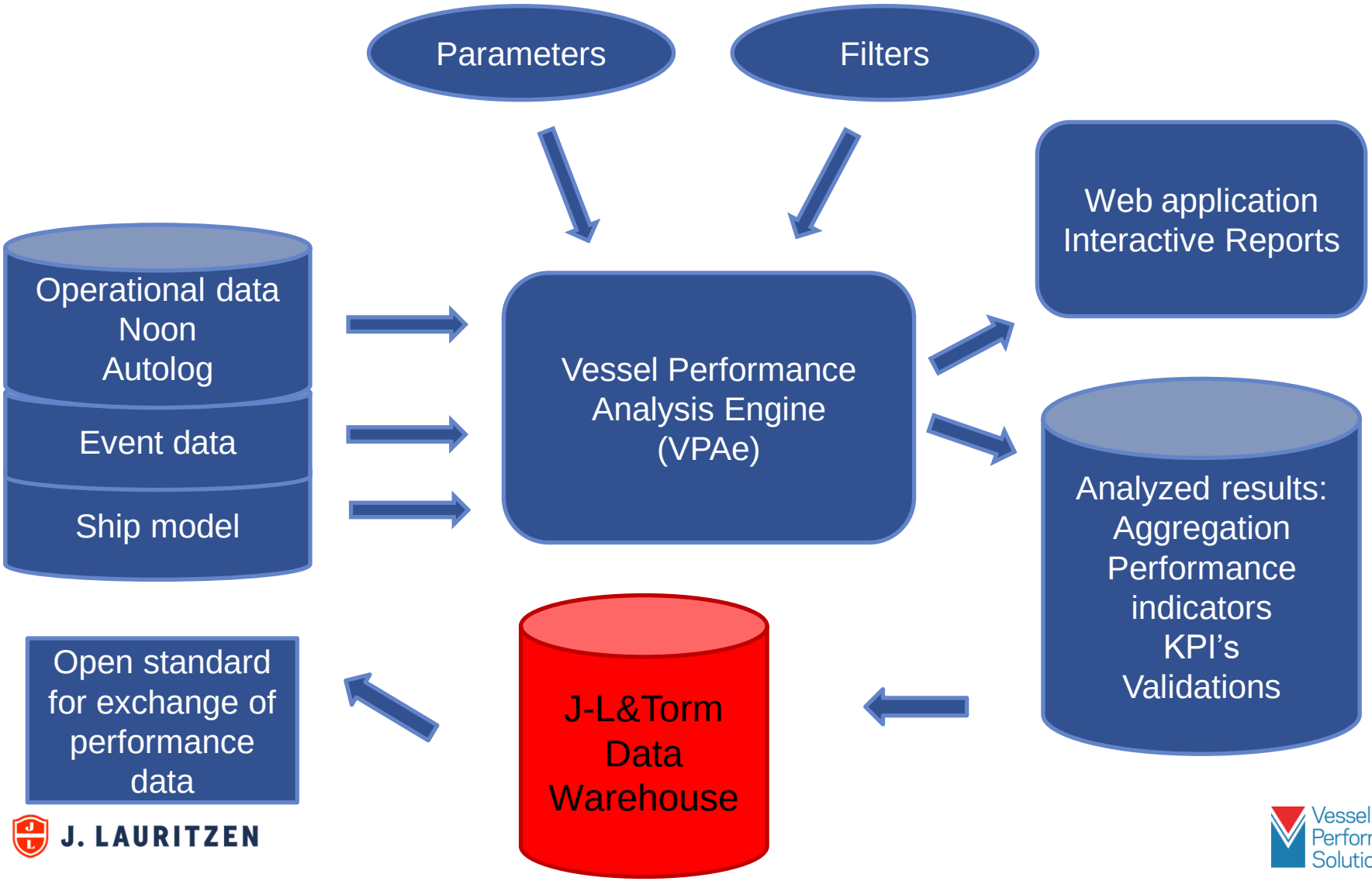
Data storage:
Noon or auto-log
Ease of access (interfacing and security)
On-board storage?

Analytics:
Models, modeling and analysis
Filtering
Noon and/or auto-log

Presentation (different stakeholders):
On-board
Office internal
Office external

Torm and Lauritzen: Three different data collection platforms in use for noon data and two/three for autolog.

THE INNOPLUS VESSEL PERFORMANCE DECISION SUPPORT SOLUTION



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VESSEL PERFORMANCE MANAGEMENT DECISION SUPPORT

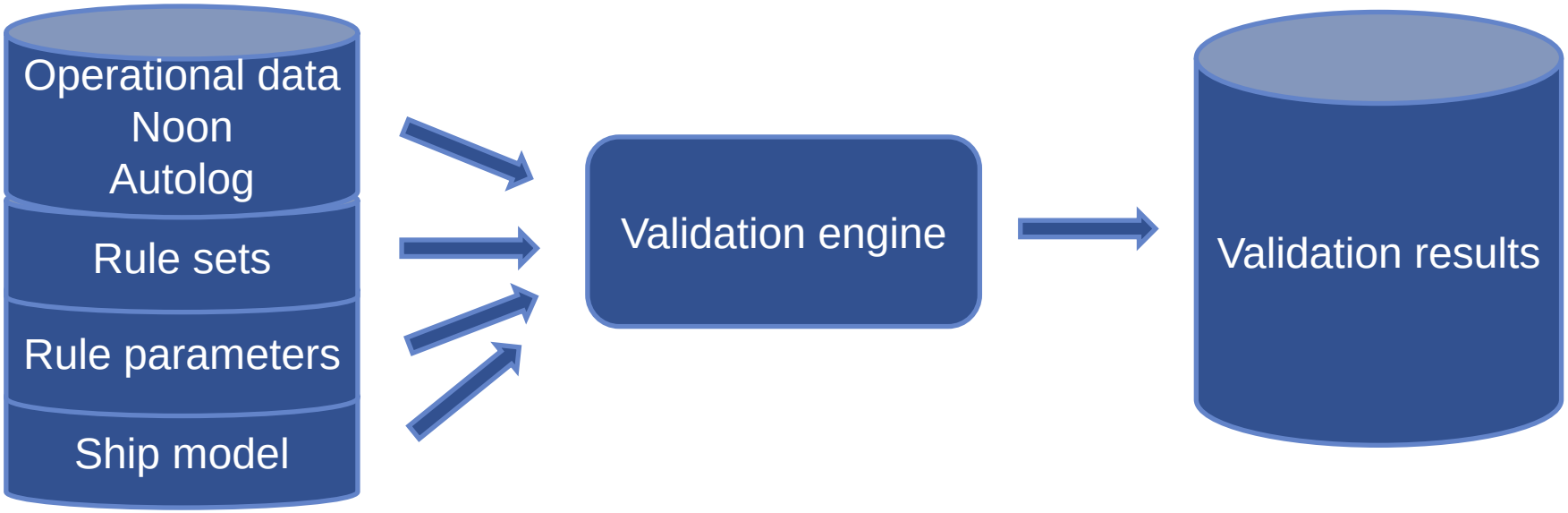
Decision support on:

- Calibrated fuel tables
- Hull&propeller performance (trending)
- Main engine performance
- Base load performance (sea&harbor)
- Boiler performance
- Fuel balance
- Data Quality (validation, PI's and KPI's)
- On-going voyages monitoring, including CP compliance
- Completed voyages CP compliance

In progress:
Consolidated scorecards, assembling all PI's (or KPI's) in one dashboard.
User defined aggregation periods: today, weekly, monthly.

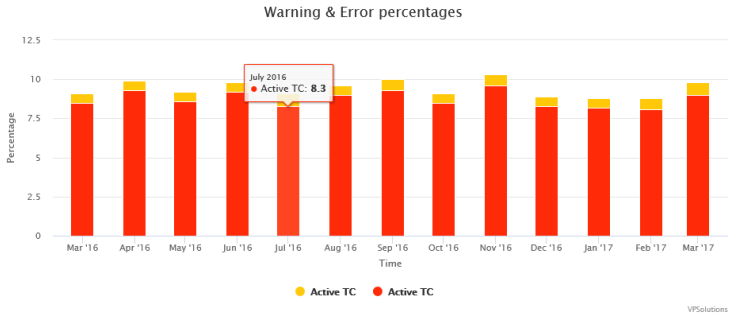
DATA QUALITY: ONE MAJOR CONTRIBUTOR TO A GOOD RESULT

Will receive data from many different data collection providers -> flexibility requirement.
Necessary with a strong pre-analysis tool for data quality assessment.



Statistical results including all vessels and all reports, possible to identify problem vessels and problem areas in the office.
Build as a module, can be used by any data collection module on-board with proper interfacing.

VALIDATION ENGINE OUTPUT

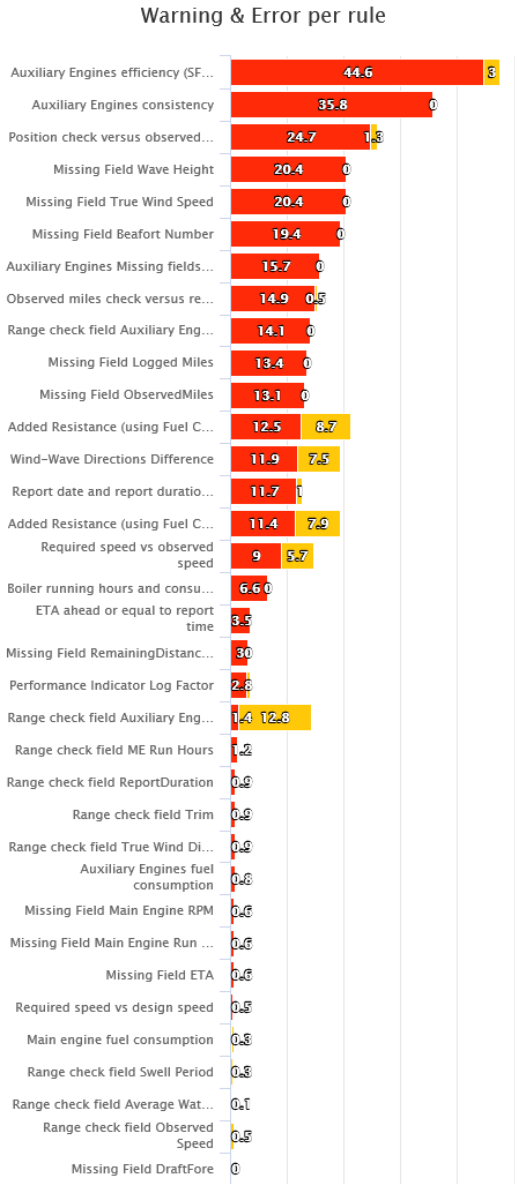


Easy identification of low hanging fruits:

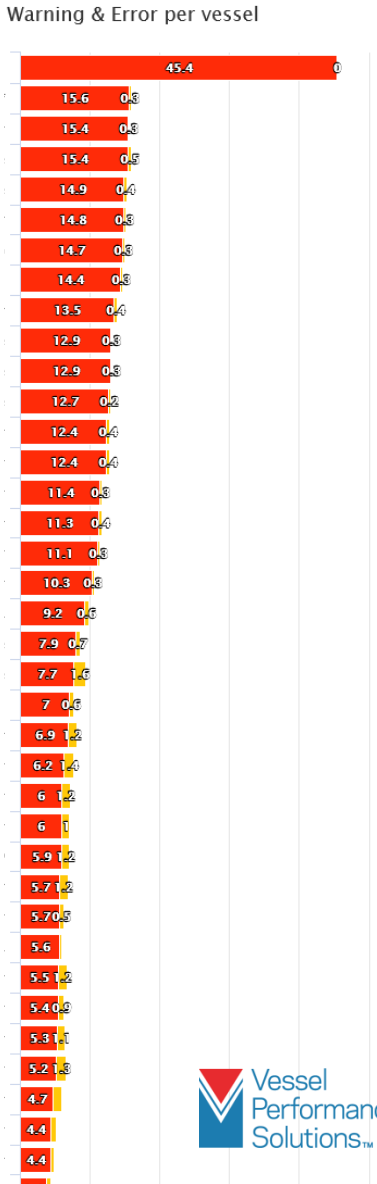
- low or high performers
- topic items

Easy to follow process; is progress moving in the right direction?

Equally relevant for autolog or noon.



Vessel names



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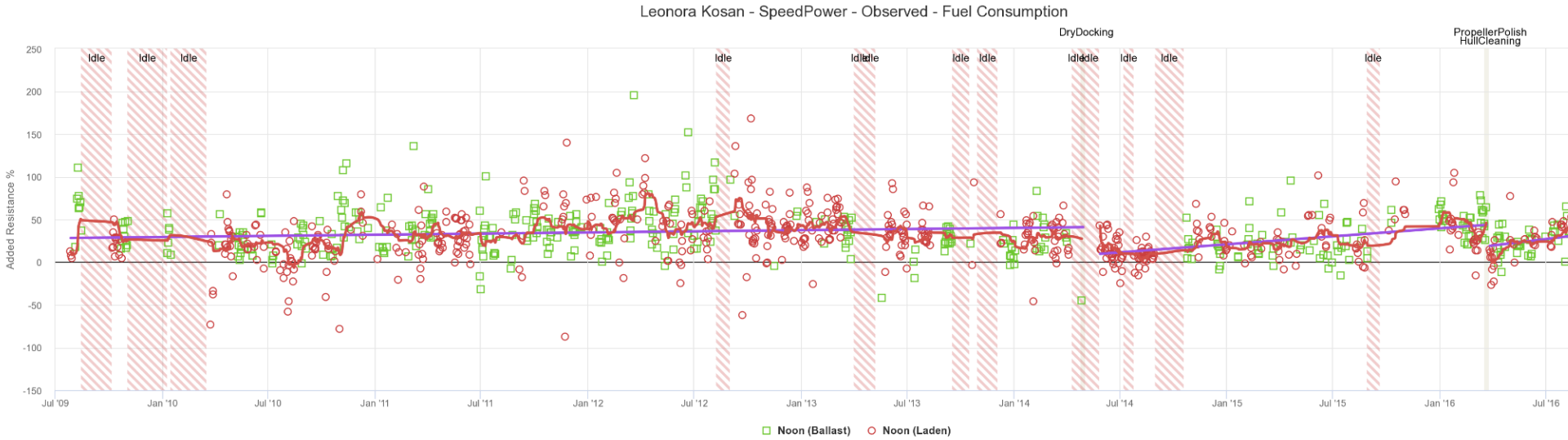
TRENDING OF PERFORMANCE:

We are using added resistance as our performance indicator for hull&propeller performance.
Normalizing measurements with respect to wind, waves, temperature, speed, draught, trim.
Comparing normalized measurement to a reference condition to establish added resistance.
VPS experience: requires good models, good algorithms and a lot of fine tuning.



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STEPS TOWARDS OPERATIONAL EXCELLENCE

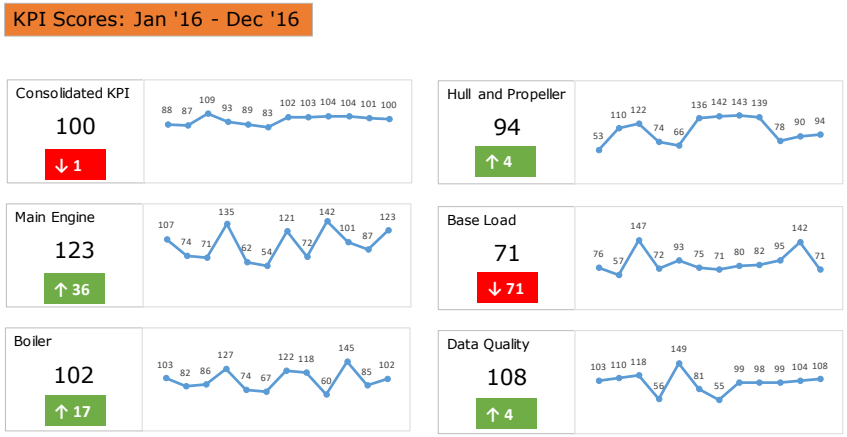
Operational excellence requires framework that support a structured process:

- Identify and develop algorithms for relevant **performance indicators**
- Establish **baselines** for relevant performance indicators
- Establish **targets** over a pre-defined period for relevant performance indicators
- Pro-actively **monitor progress** towards target throughout monitoring period

The framework that has been designed in the INNOplus Vessel Performance Decision Support project will in its final version support such a process:

- System supported data driven KPI process for the fleet
- Monitor the progress daily, weekly, monthly for fleet, groups, individual vessels.
- At very early stage (daily) catch non-performance fleet wise, groups etc.

Assembling relevant performance indicators and KPI's into one dashboard:



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CONCLUSIONS

Big data and internet of things requires open and transparent interfaces between systems.

Different shipping companies have different needs

The VPDS project has developed a performance platform with a modular structure:

- data collection,
- data storage,
- analysis engine (VPAe) with modular validation engine,
- presentation layer

with transparent interfaces. Possible to interface to the VPAe and the validation engine from third party applications.

Open standard will enable easy exchange of operational performance data.

Most importantly, the participating shipping companies have achieved significant results over the last 18 month.

The latest developed modules will deliver further fuel and operational savings as well as improvements in data quality for the shipping companies in 2017.