Digitalisation and Smarter Maritime Operations

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Digital Strategy

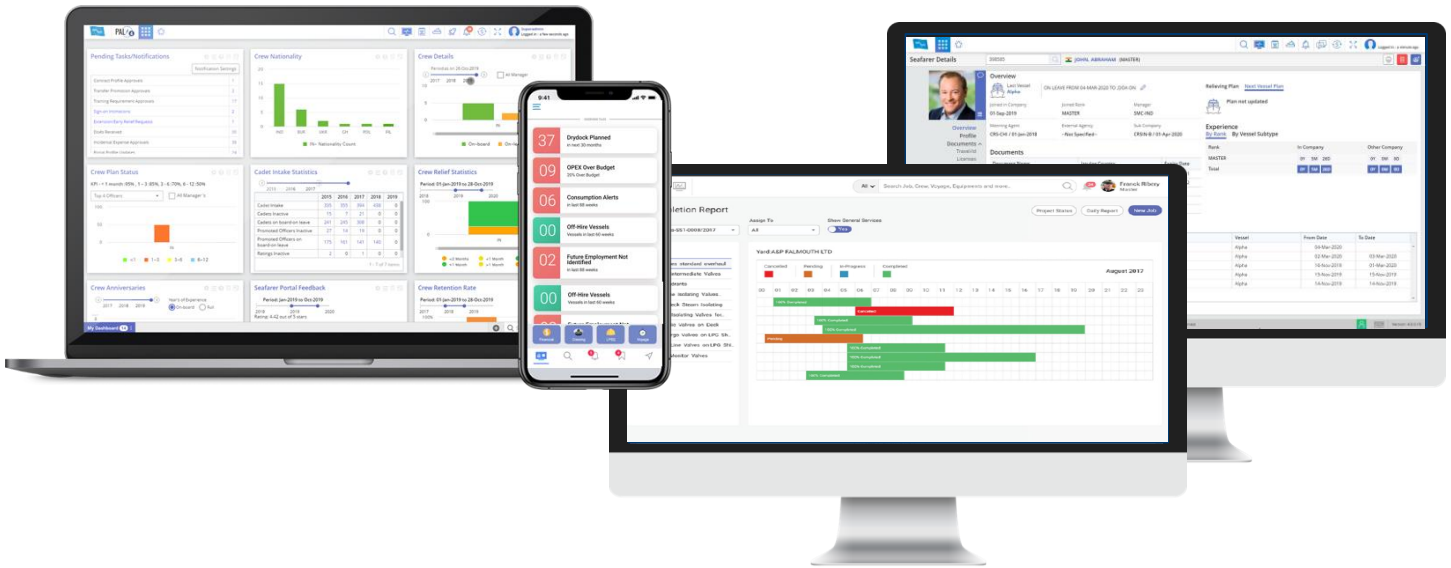
- **Modern digital solutions are a key differentiator in service provision** for clients, seafarers, office staff and business partners.

- **Digital innovation has provided a wealth of information and insights** to optimise fleet management, automate processes, increase business performance, improve operational efficiency and reduce costs.

- **Digital revolution of Industry 4.0** will mean change for the maritime industry and its critical to be pro-active as the changes will be fast.

Smarter maritime operations

- Real time data from vessels straight to your dashboard.
- Seamless data migration between shore and sea.



Smart Maintenance – The Aim

Preventive Maintenance → Predictive Maintenance.

- Fleet reliability.
- Safety of machinery and equipment.
- Increase crew safety by reducing mechanical incidents.

Different Approaches to Maintenance

Break-down Maintenance:
No plan beyond complete replacement upon failure.

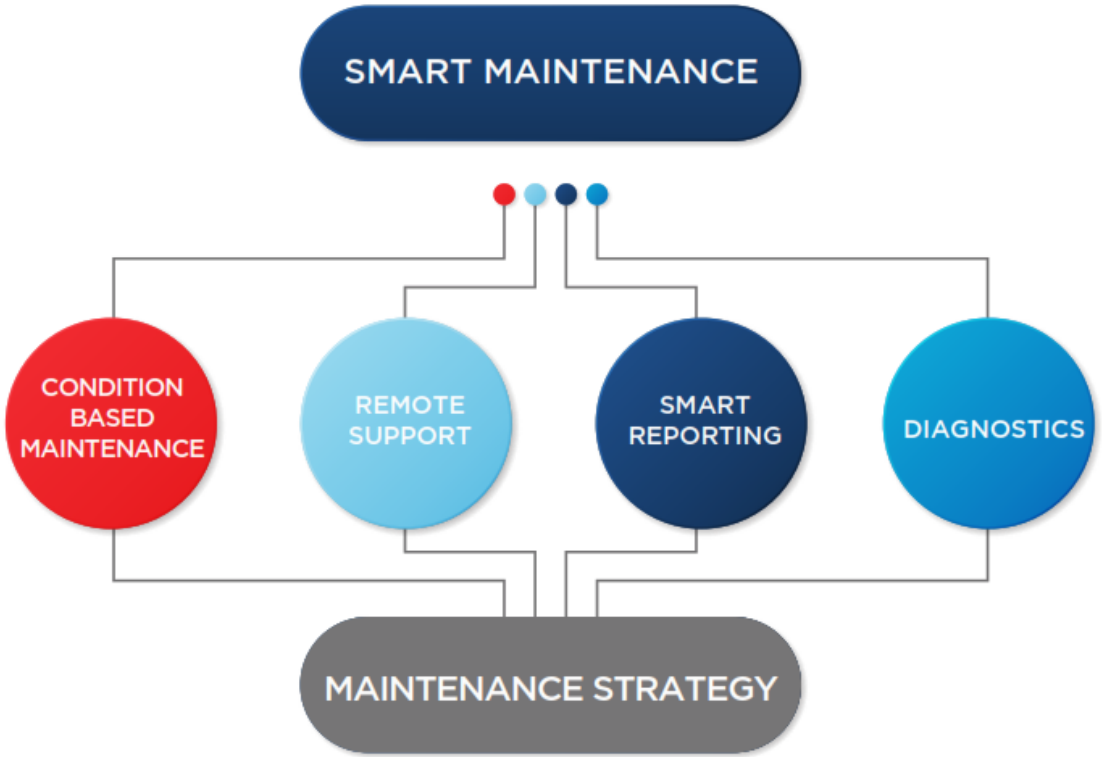
Preventive Maintenance:
(Planned Maintenance) Inspection and overhaul at specified time periods/number of running hours, to ensure satisfactory condition.

Condition-Based Maintenance:
Maintenance based on performance or physical state of the structure/system/component.
Determined by regular or continuous parameter checks.
Only when conditions have approached or reached the lowest acceptable standard maintenance is undertaken.

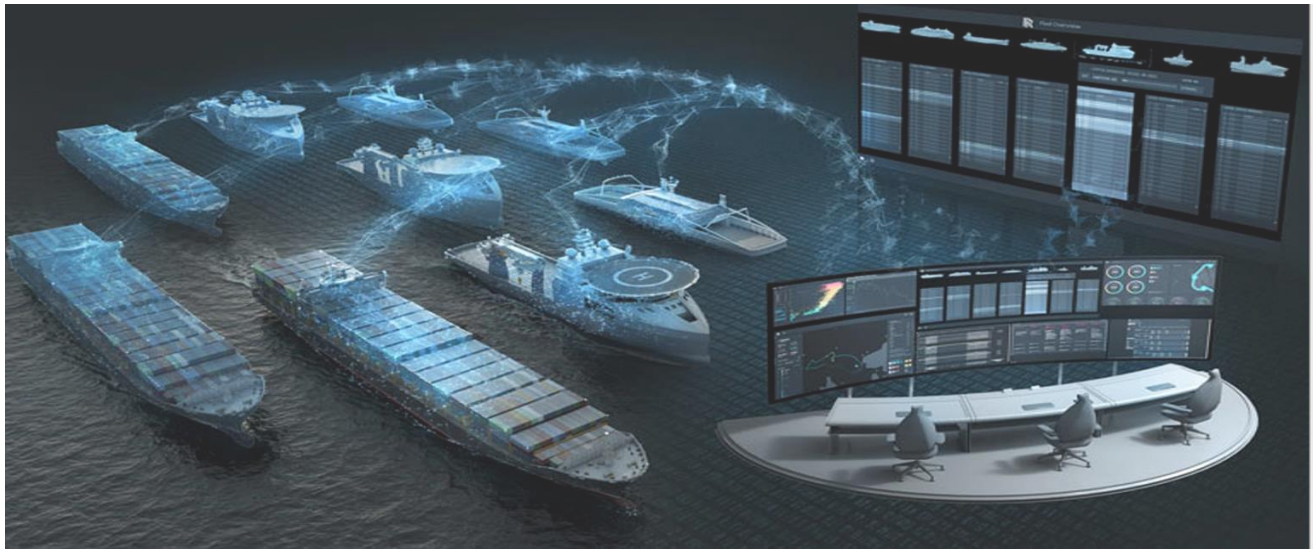
Predictive Maintenance:
Uses advanced analysis & machine learning techniques to identify acceptability of continued service or requirement for maintenance.
Gives the possibility of identifying the Remaining Useful Life (RUL) of a component.
Using PMS daily routines, port calls, spare part availability, time to receive spare part, to suggest the optimum slot for maintenance.

Reliability Centred Maintenance (RCM):
Integrates all above techniques
To increase probability a machine/component will function in the required manner over its design life cycle, with minimum maintenance.

Smart Maintenance – The Basics



- Reliable vessel operations through digitalised proactive maintenance.
- Harvesting the benefits of Condition Based Maintenance (CBM) diagnosis.
- Supported by Remote Support, Smart Reporting and Diagnostics.



Smart Maintenance – The Benefits

- Eliminate unplanned failures and related repair costs with early detection.
- Extension of overhaul periods (as long as the vessel’s equipment is still functioning properly).
- Increase in fleet reliability.
- Increase crew safety and asset reliability.
- Reduction of equipment downtime.
- Achieving better prices for spare parts by predicting when they will be needed.

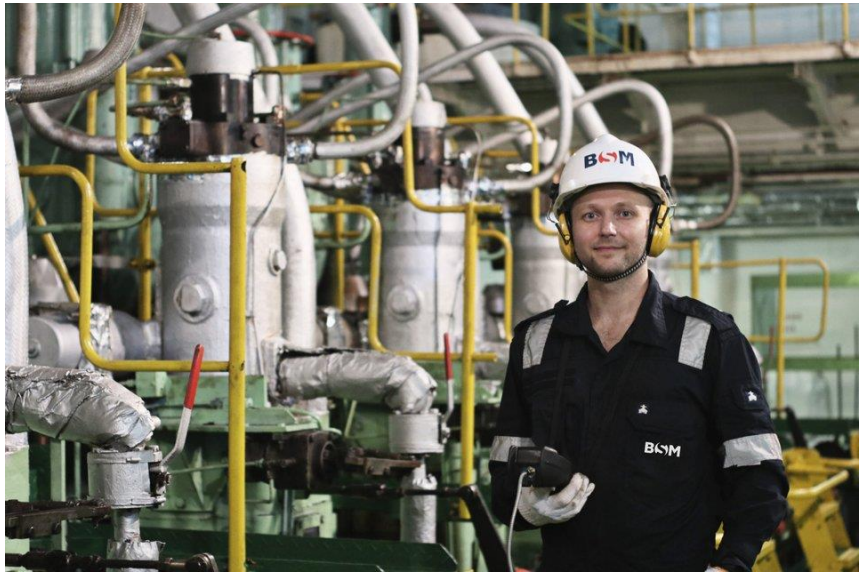
Condition Based Maintenance (CBM)

The core of a maintenance strategy, to move from the present Preventive Maintenance to Condition Monitoring.

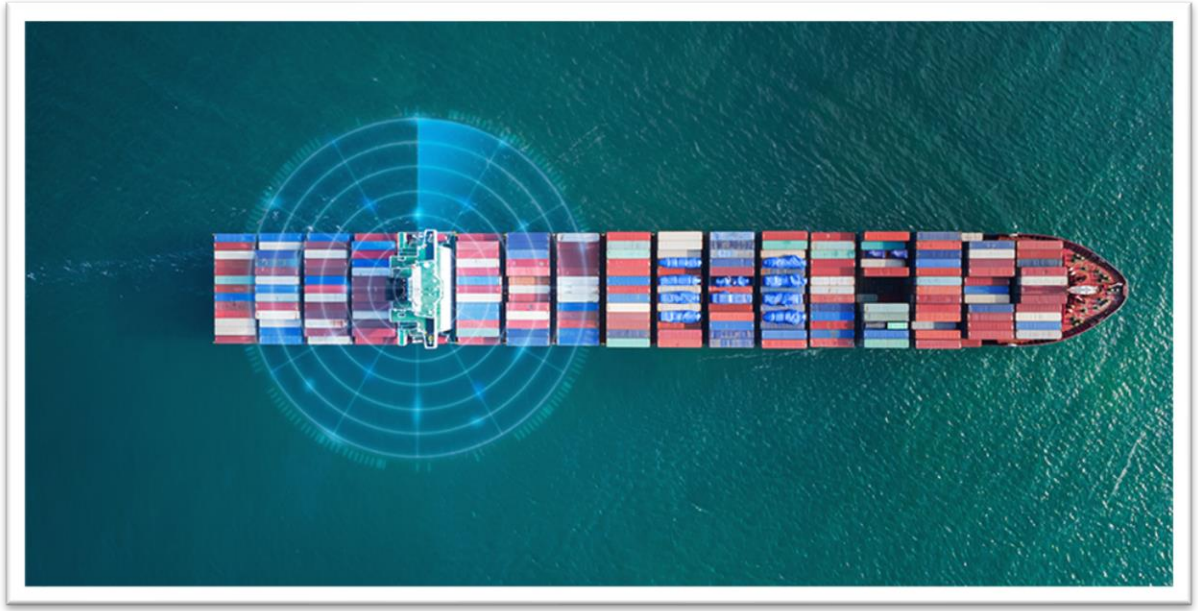
CBM makes maintenance procedures of a vessel more flexible, by determining actual health status and condition of the machinery instead of doing maintenance in fixed pre-defined intervals.

Includes advanced technologies, for example:

- Artificial intelligence algorithms.
- Vibration and acoustic analysis.
- Image process fault recognition.
- Smart glasses.



Remote Support



Remote Support

- Assists crew with maintenance or emergency situations.
- Enables specialists onshore to be remotely connected to on-board systems in real time.
- Allows for remote class surveys.
- Relies on livestreams with vessels at sea or port.

Wi-Fi coverage anywhere on board

A precondition for remote maintenance is Wi-Fi anywhere on board

Using touchpads with cameras or even 3D glasses, the crew can literally bring the shore staff live on board.

Maintenance Strategy Further Steps

Smart Reporting:

- Digitalises technical and operational reports such as;
  - scavenge inspection report.
  - master & pilot information exchange report.
  - tank inspection report.
- Smart analysis and meta-data.
- Smart configuration of the reports for each vessel.

Diagnostics:

- Improves machinery life span.
- Smart Analytics.
- Uses business intelligence reports to evaluate quality of maintenance.

SmartOps – The Basis

Designed to capture data of entire vessel operations and integrates the data gathering and reporting needed for EU MRV & IMO DCS

- Reports and Port Call Scheduling.
- Regulatory Compliance.
- CII Dashboards - Fleet-wide Overview of CII scores with future projections.
- CII Calculator - CII Prediction for the next voyage based on weather and auxiliary consumption forecasts.
- CII yearly Simulator - Predicts CII for the year considering the projected activity profile based on historical data.

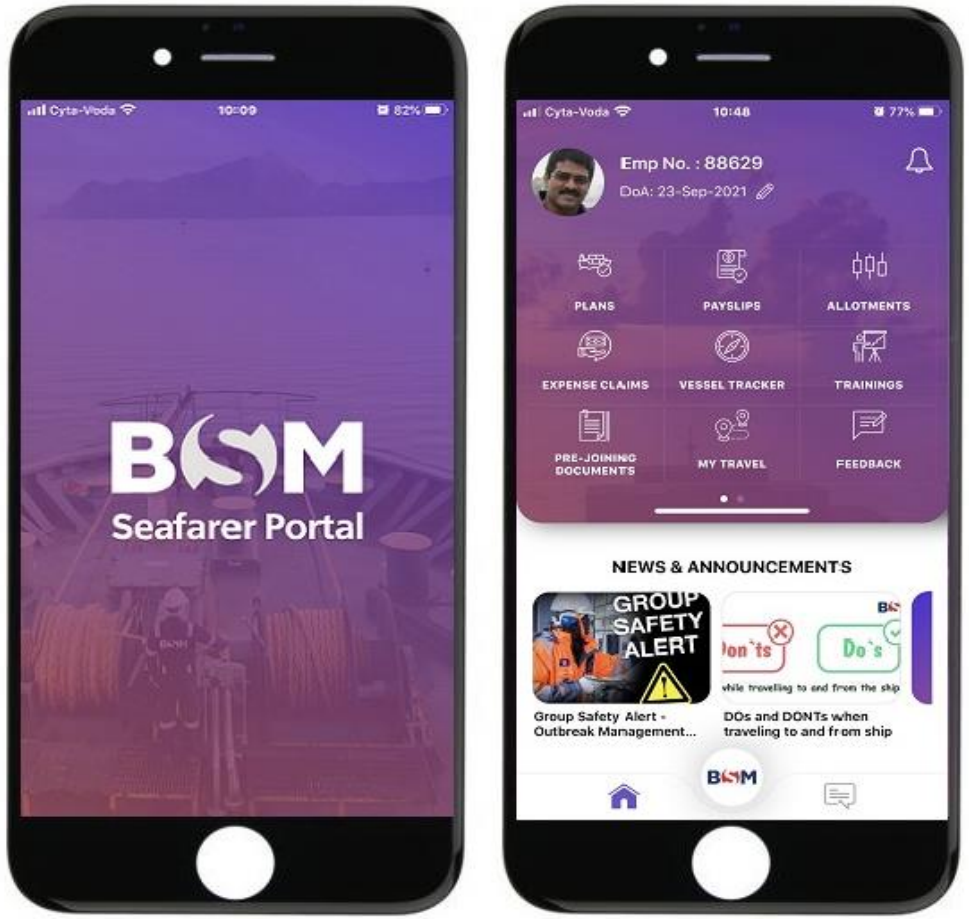
Business Intelligence

PAL BI

Tools for analysis of multi-dimensional data

- Quickly evaluate company performance with graphs, charts and diagrams.
- Fleet management, LPSQ, Fleet Performance, Vessel Management etc.
- Instantly drill down data to yearly, quarterly, monthly and daily levels.

Seafarer | Portal



- Track, monitor, and communicate with vessels anytime, anywhere.
- View planned voyages, scheduled trainings, and provide date of availability.
- Travel documents.
- Allotments, detailed payslips, and incidental expenses.
- Live Chat with crewing department.
- Full documents download, with expired highlighted at the top of the list.
- Alerts and notices: Changes in any of the above, and can also send customised alerts i.e IMO rule changes.

LiveFleet

Real-time access to vessel data for owners via desktop

- Vessel position, voyage tracking, current speed, and technical details of vessels.
- Vessel performance metrics.
- Crew lists and distribution by nationality.
- Operational, financial, noon, planned maintenance, purchase reports, and vessel employment reports.
- Full drill-down capability, to transaction data
- Analytical tiles to deliver clear insights of opex over budget, off-hire, idle and non-employment vessels.
- Business process made fast and efficient with queries and feedback feature.
- Entity-wise reports on each category with comments enabled.
- Readily available notifications with reports and data.


Thank you very much!
Bernhard Schulte Shipmanagement Hellas