Wärtsilä Voyage Solutions

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**SMART TECHNOLOGIES, WHY?**

€20 Billion waste, not addressable by conventional product development*

<table>
<thead>
<tr>
<th></th>
<th>Fuel efficiency</th>
<th>Time at Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offshore</td>
<td>0.2 BEUR</td>
<td>0.7 BEUR</td>
</tr>
<tr>
<td>Cruise</td>
<td>0.5 BEUR</td>
<td>-</td>
</tr>
<tr>
<td>Ferry</td>
<td>1.3 BEUR</td>
<td>-</td>
</tr>
<tr>
<td>Gas Carrier</td>
<td>0.3 BEUR</td>
<td>1.0 BEUR</td>
</tr>
<tr>
<td>Containership</td>
<td>14.5 BEUR</td>
<td>2.1 BEUR</td>
</tr>
</tbody>
</table>

* Identified in McKinsey Project Exploration study

### Disruptive forces

- **Big data analytics**
- **Smart ports**
- **Intelligent vessels**

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“Smart Marine” means connecting the dots in the Maritime Domain using all available digital technologies.

- Crew workload
- Weather routing
- Engine usage and condition
- Connectivity / Communication
- Charts & Data delivery
- Emergency response
- Speed optimisation
- Just in time arrival
- Real time tracking
- Tailored notifications
- Take me home solution
- Mobile onboard
- Voyage reporting (arrival, noon, departure, etc.)
- Radar
- Remote maintenance
- Hull degradation
- EU-MRV / IMO DCS
- Cyber Security (no USB sticks)
- Voyage planning
- Charter Party
Average cost of Low-sulphur fuel oil (LSFO) is currently around $600 per ton, compared with $460 twelve months ago. Tanker analysts at Braemar ACM calculated the difference in price between HFO and LSFO of around $200 per ton.

The numerical example illustrates the additional costs when switching from HSO to LSFO:

• A containership of around 8,000 TEU consumes about 225 tons of bunker fuel per day at 24 knots.

• This results in additional expenses when switching to LSFO of $45,000 a day.

• But, if the containership slows down to 21 knots, the fuel consumption drops to about 150 tons per day, a 33% decline in cost.
What IF your ECDIS was connected  - Benefits ?

- Remote maintenance and service
- Navigational Data Management and Voyage Planning
- Cyber resilience
- On board data collection
- Advanced Analytics
- Data Exchange with Shore based entities (STM, Ports, etc.)
- Fleet Performance Management
97 PERCENT OF THE SERVICE REQUESTS / CALLS COULD HAVE BEEN SOLVED REMOTELY

- The Smart Technology and the connection allows to precisely identify the cause of the issue
- Requirement for the crew to help and describe the situation are reduced substantially (the crew is less involved)
- Having full insights into the equipment and its health allows us to send the right spare parts when needed
- Software related requests can be solved remotely.
- Even software updates and patches can be applied remotely
DATA COLLECTION

EXAMPLE : ON BOARD DATA

- Redundant „Take me home” solution for navigation
- Extensive reporting and log functionality with automatic pre-filling (SmartLog™)
- Decision support notifications on safety and efficiency
- 20-30 min traffic forecast and maneuver prediction

DATA COLLECTION

- Tracking & navigational safety awareness
- Bridge Mobile/Tablet Application
- ECDIS Planning Station
- Communications link
- Radar
- Voyage optimization
- Hull and engine condition
- Training
- Maintenance
- Charts, Publications, Weather
- Stakeholder reports and compliance (C/P, EU, IMO)
ADVANCED ANALYTICS

CHARTER PARTY ANALYTICS

Charterparty Fleet

Monthly Trend (12 months)

- OVER CONSUMPTION IN GOOD WEATHER
- CONSUMPTION VS GUARANTEE
- TRADE AREA
- CONSUMPTION VS MODEL

1 month
- Owner 1
- Owner 2
- Owner 3

Vessels

SEARCH FOR A VESSEL

<table>
<thead>
<tr>
<th>Vessels</th>
<th>Time in Good Weather (%)</th>
<th>Consumption in Good Weather (MT/SD)</th>
<th>Consumption (MT/SD)</th>
<th>Difference with Guaranteed Consumption (MT/SD)</th>
<th>Difference with Virtual Fuel Flow (MT/SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner X's Vessels</td>
<td>50 %</td>
<td>19.0</td>
<td>28.21</td>
<td>8.09</td>
<td>4.3</td>
</tr>
<tr>
<td>Capesize (4)</td>
<td>57 %</td>
<td>7.4</td>
<td>26.2</td>
<td>8.09</td>
<td>1.7</td>
</tr>
<tr>
<td>M/V Goldcrest</td>
<td>51 %</td>
<td>9.4</td>
<td>30.2</td>
<td>14.09</td>
<td>7.4</td>
</tr>
<tr>
<td>M/V Golden Eagle</td>
<td>68 %</td>
<td>9.8</td>
<td>27.2</td>
<td>17.01</td>
<td>2.3</td>
</tr>
</tbody>
</table>
DATA EXCHANGE

FOR EXAMPLE : PORTCALL
Fleet Operations Solution can be scaled from a single mobile phone to a complete fleet operations center

- e.g. critical alerts
- e.g. full fleet tracking, incl. Routing, Speed and ETA management
Autonomous or automatic control removes some of the unpredictability of vessel operation.

Autonomous systems can detect changing conditions earlier than a human.

Autonomous control allows complex operations to be reduced to a short list of commands.
• Reduction in vessel and lock damage
• Closed loop controller provides lock assist mode
• Uses a system of tracks and waypoints, engagement zone
• Positions vessel at mid-point of entrance to the lock with ships heading aligned, ready for the Master to take the vessel into the lock
• Faster and safer docking
• Vessel based sensors without the need for dock based reflectors
• Uses augmented reality video to provide the master with pinpoint accuracy
• SmartQuay delivers an accurate gap measurement between the vessel and the nearest extended object.
• Displaying the vessel's predicted future position and heading
  - Predicted position and heading are continuously updated as forces on the vessel change (wind change, thruster rotation, etc....)

• Using proven DP analysis algorithms to evaluate forces affecting the vessel providing advanced motion prediction

• Configurable prediction time display
System installed on the Norled ferry “Folgefonn” which operates on the west coast of Norway

Nov 2018

Full dock to dock operation demonstrated

Video available: https://m.youtube.com/watch?feature=youtu.be&v=8uedSwkeaUg

April 2019

Further testing of transit and docking features with new HMI
Thank you