

MARITIME

# Drone assisted surveys to improve customers' operations and surveyors' safety

Vegar Rype DNV GL

**Vegar Rype**

26 April 2019

# DNV GL Business Areas



MARITIME



OIL & GAS



SOFTWARE

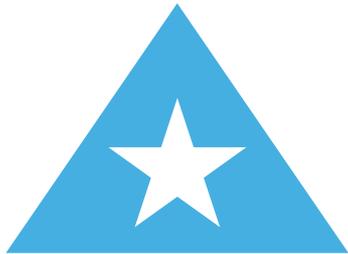


BUSINESS  
ASSURANCE

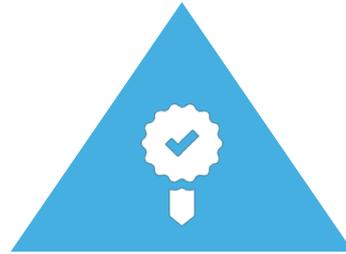


ENERGY

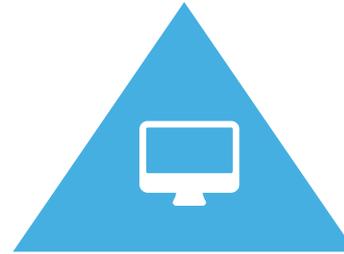
## Services



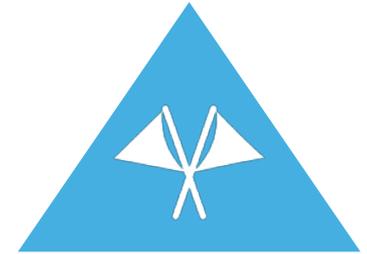
CLASSIFICATION



TECHNICAL  
ASSURANCE



SOFTWARE



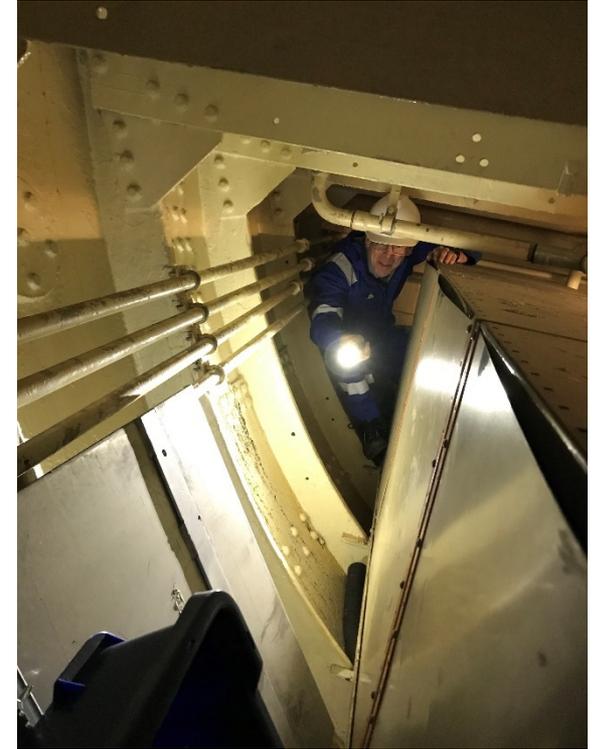
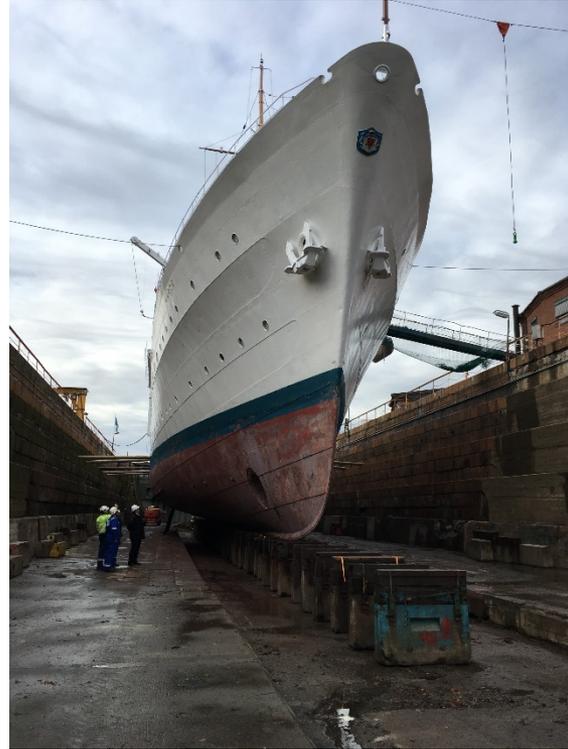
ADVISORY

RESEARCH & INNOVATION

# Classification is about ships



# Classification is about ships



## And offshore units



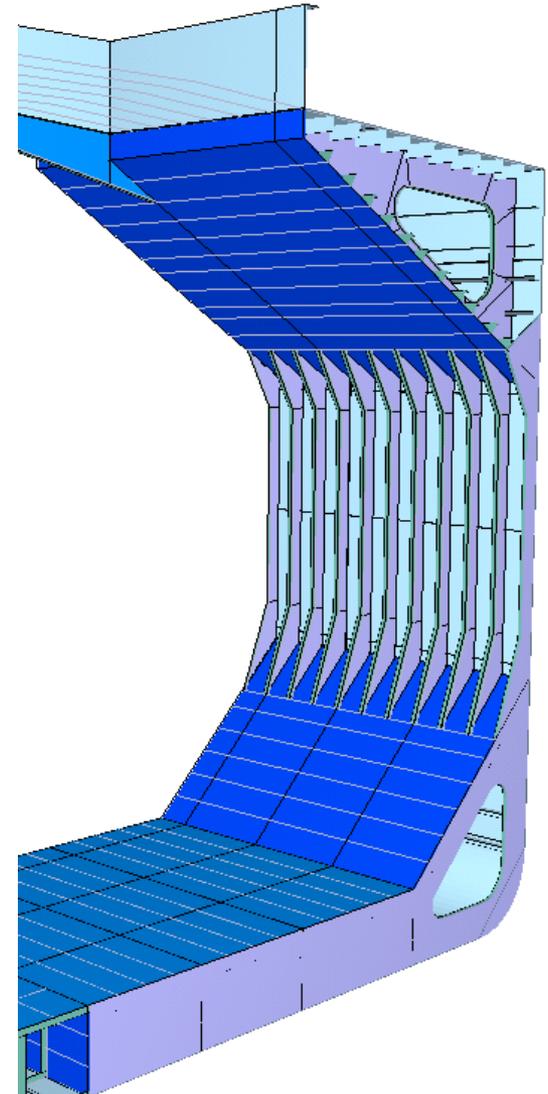
## Classification Societies – Background

- Major Societies established by marine insurers more than 150 years ago
- Increase in international trade in the middle of the 18th Century.
- Ship owners needed insurance to reduce their economical risk.
- **Insurers** needed someone to establish safety standards for ships and to verify that the standards were complied with.



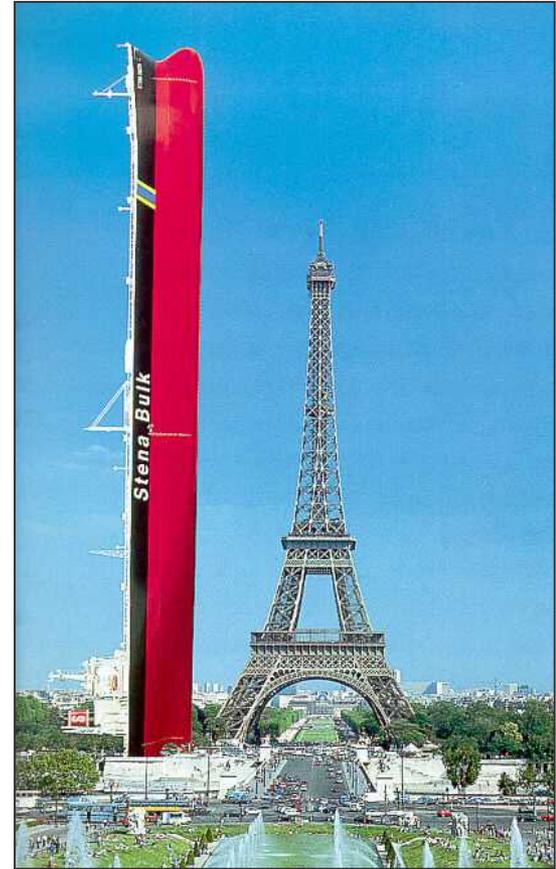
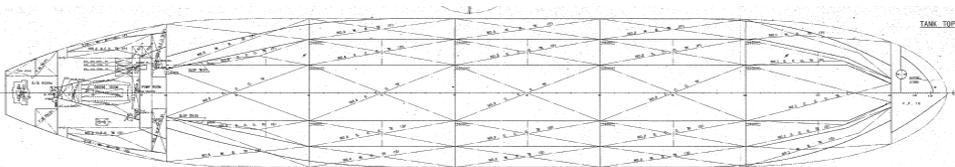
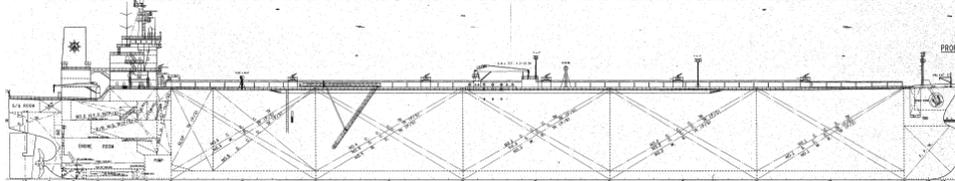
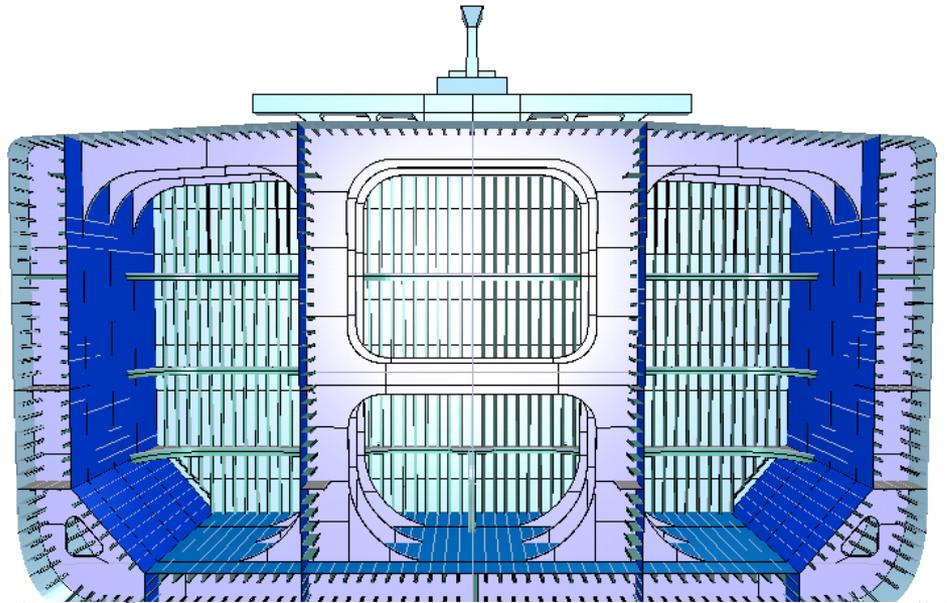
# Surveys are time-consuming, costly and dangerous.... - but necessary

- Common Bulk carrier design (Panamax)



# Surveys are time-consuming, costly and dangerous.... - but necessary

- Common tanker design  
(VLCC)

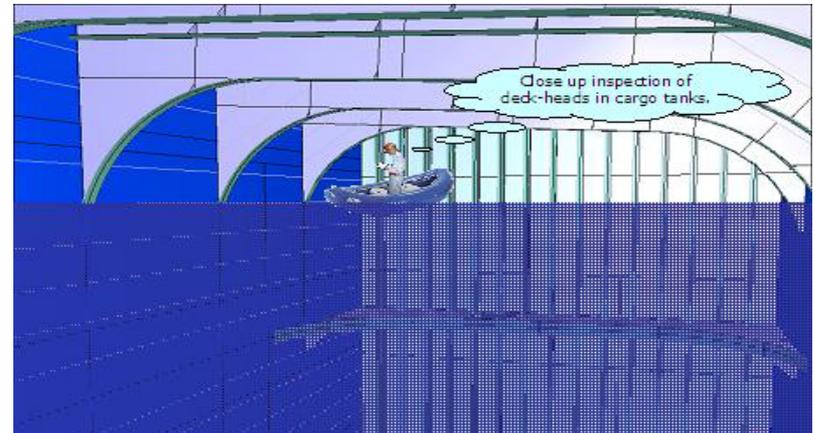


Typical vessel: 410,000 dwt, L=377,0m,  
B=68,0m, T=23,0m, D=30,0m

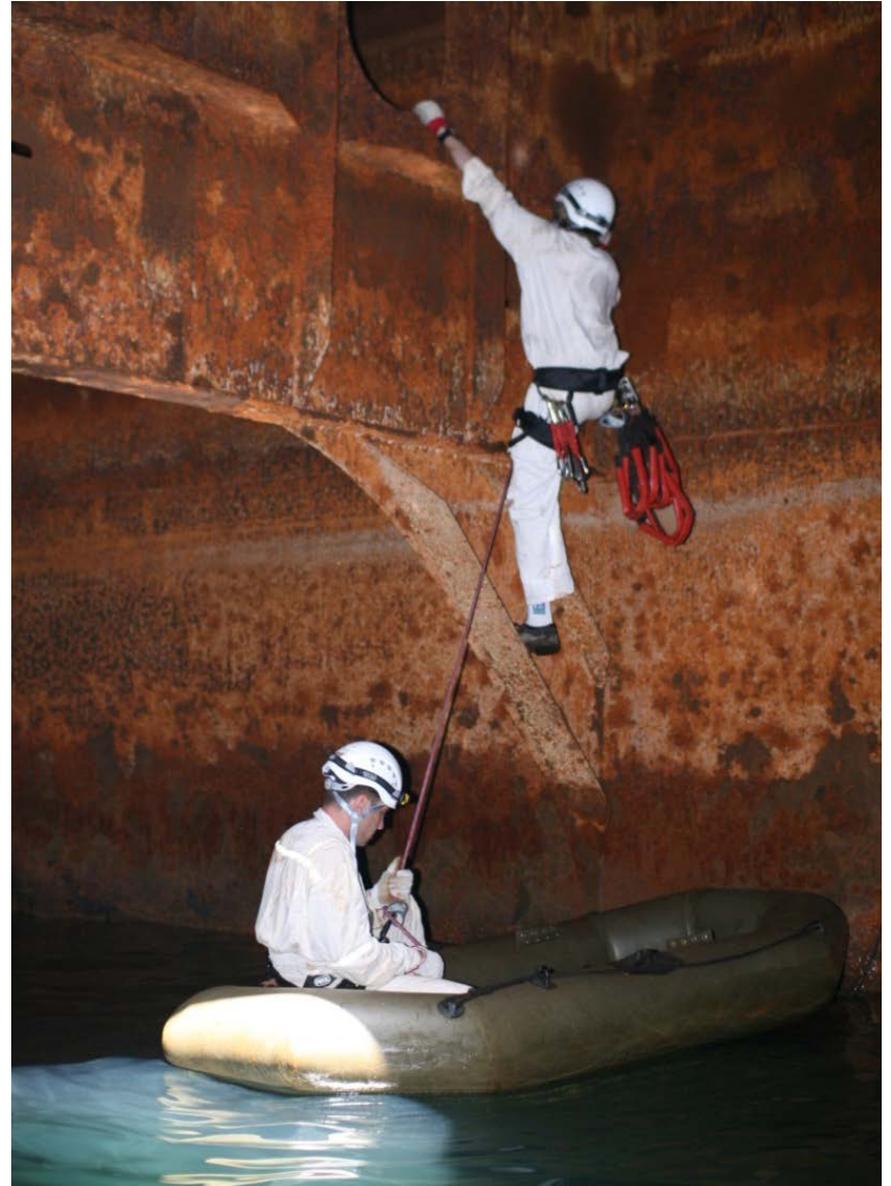
## How to get up there? Staging



## How to get up there? Rafting



## How to get up there? Climbing



## How to get up there? Cherry Picker



# Or by a drone!!



# Developing a Drone Inspection Approach

DNV GL has invested a substantial amount of time for testing many types of drones in different types of ships and different enclosed compartments

The following parameters were considered specifically

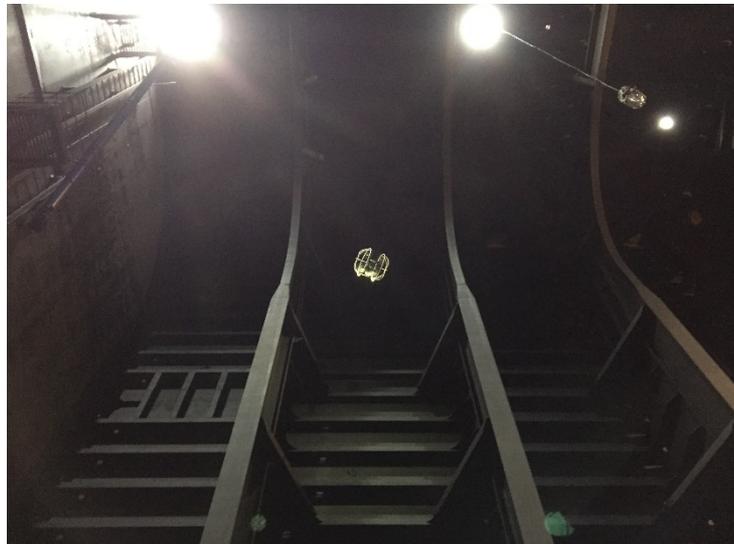
- Control of the Drone
- Lighting
- Camera position and Quality and remote operation
- Pilot training
- Drone resistant to close contact with the structures.



# Different Alternatives



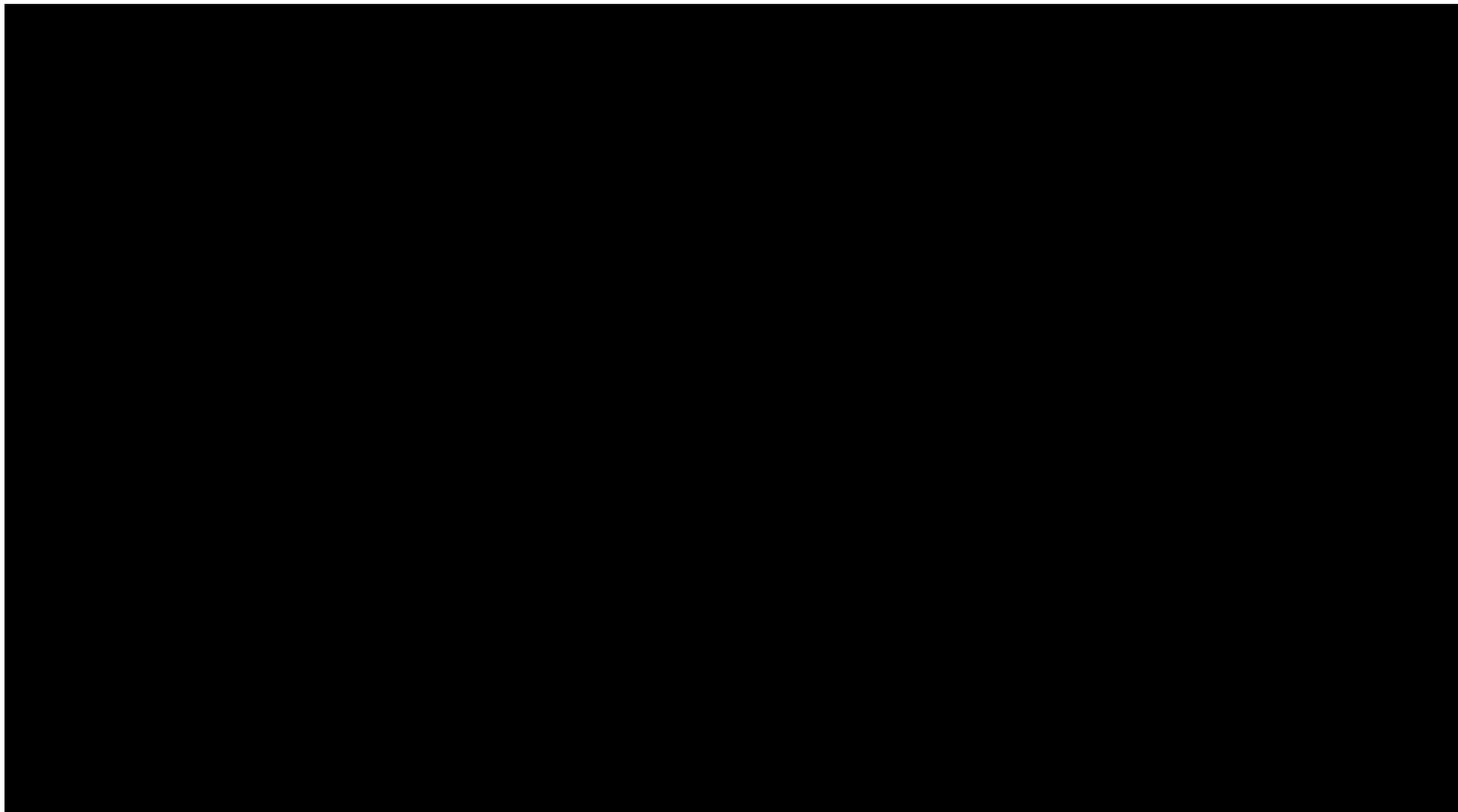
# On-board Tests



**Bulk Carrier**

## Test Survey 2

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# Tested on Different Vessel Types



Tanker for oil



Transverse bulkhead stringer connection to longitudinal bulkhead, abt. 15 m above inner bottom



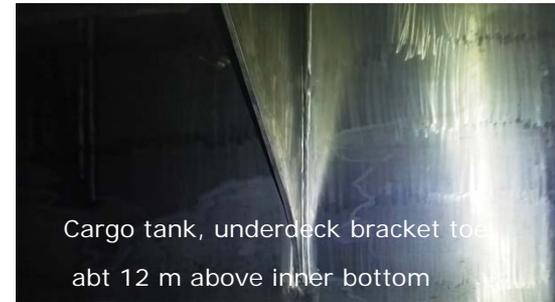
Deck web frame, abt. 20 m above inner bottom



Tanker for chemicals



Cargo tank, underdeck bracket



Cargo tank, underdeck bracket toe, abt 12 m above inner bottom



Bulk Carrier



HOME(18.5203,54.5358) 2016.01.15 13:32:37  
GPS(18.5206,54.5362,16) BAROMETER:21.7  
ISO:343 Shutter:25 EV:+1 Fnum:F2.8



Upper bracket side frames



LPG



Cargo tank, upper part

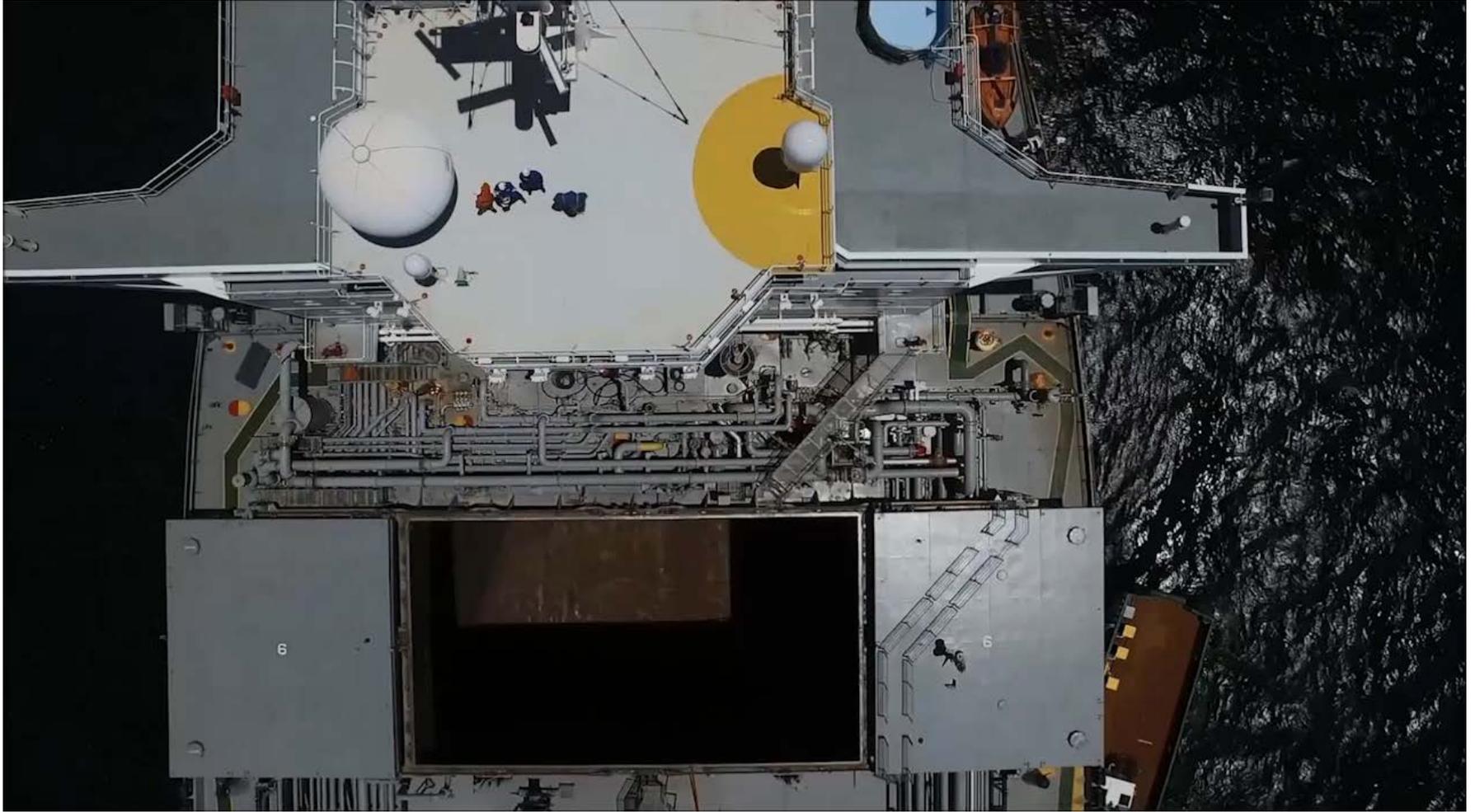


Cargo Tank

# Limitations



# Production Survey - OBO



## Production survey semi-sub

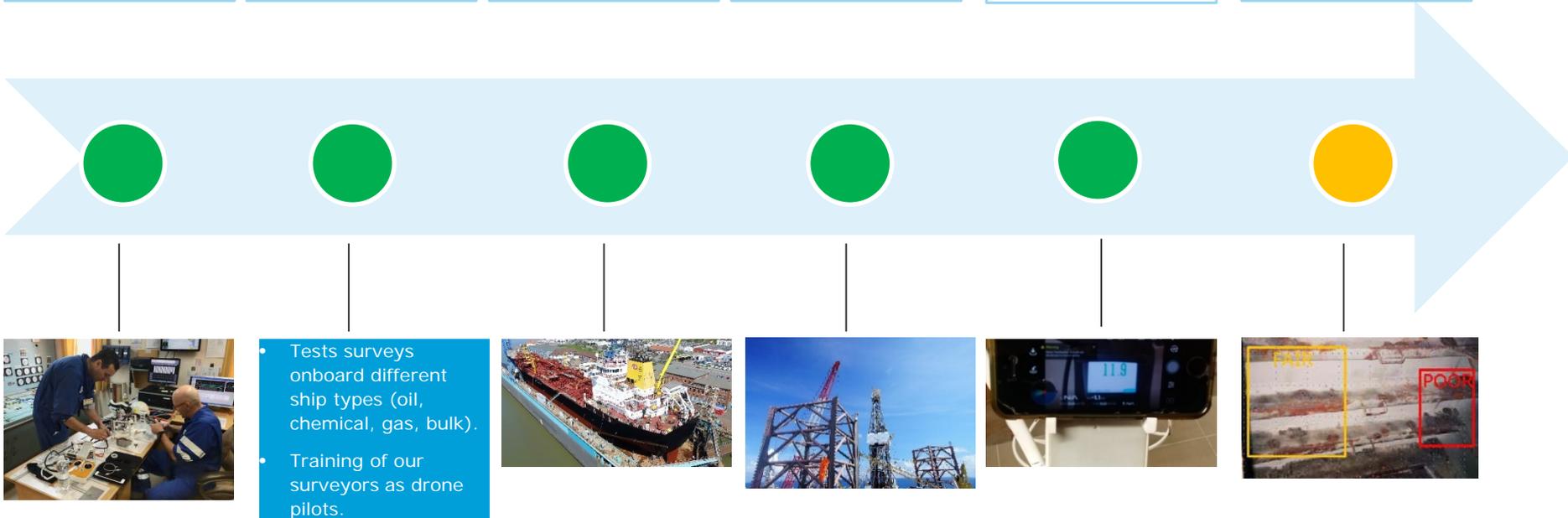
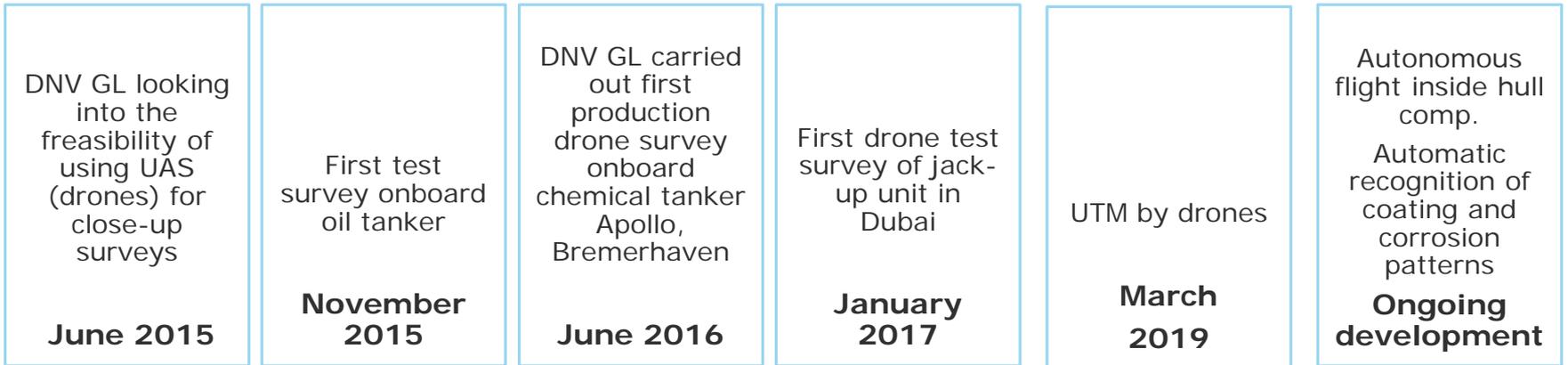
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# Stations with drone surveyors



# Drone Survey Development - Timeline



# Questions

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[www.dnvgl.com](http://www.dnvgl.com)

SAFER, SMARTER, GREENER