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# Maximizing performance by providing **THE FULL PICTURE**



## Min Agenda:

Langtidsplanlegging av vedlikehold  
og energieffektiviserende løsninger

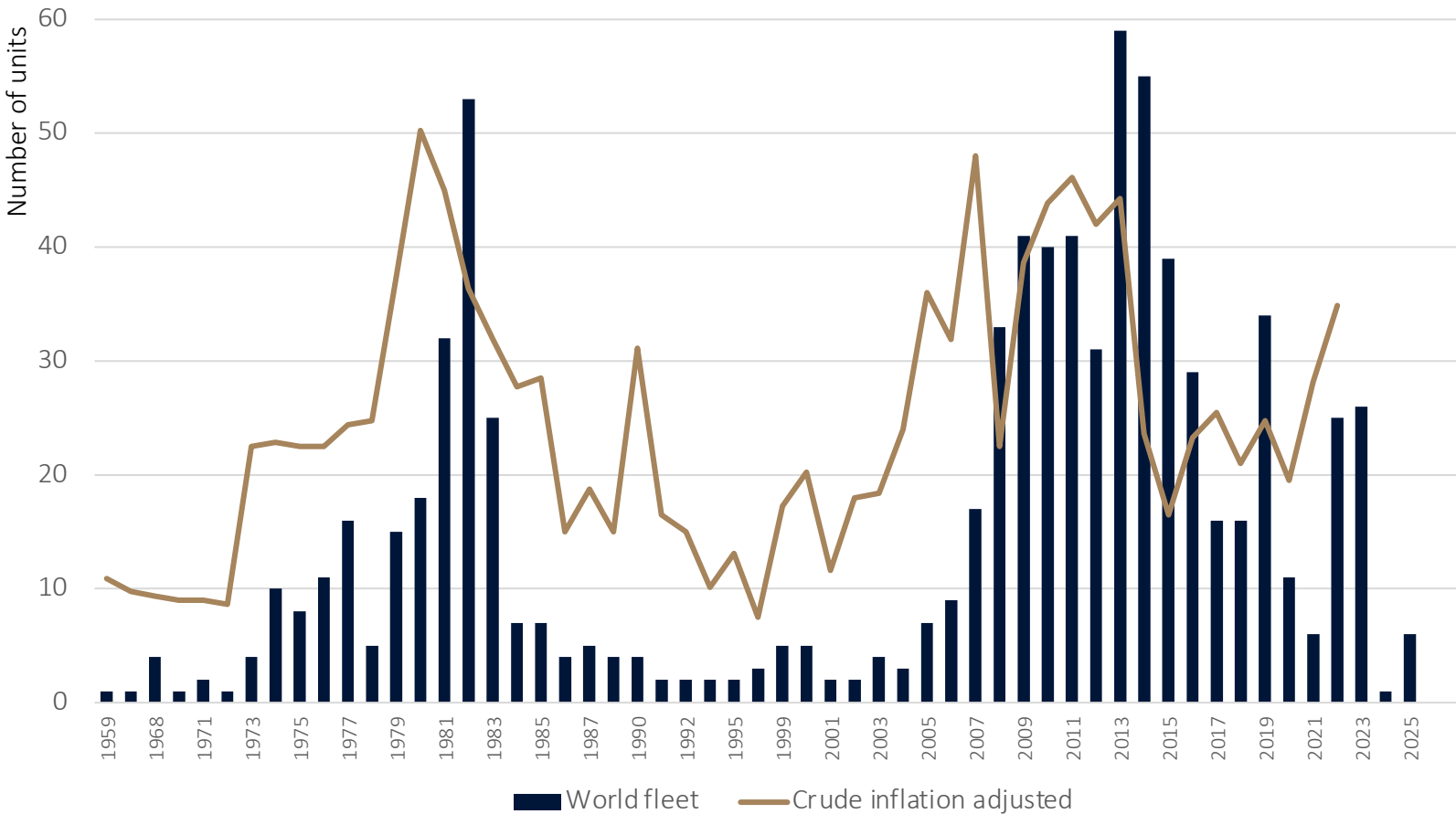
André Hogsrød, Sales Manager, Kongsberg Maritime



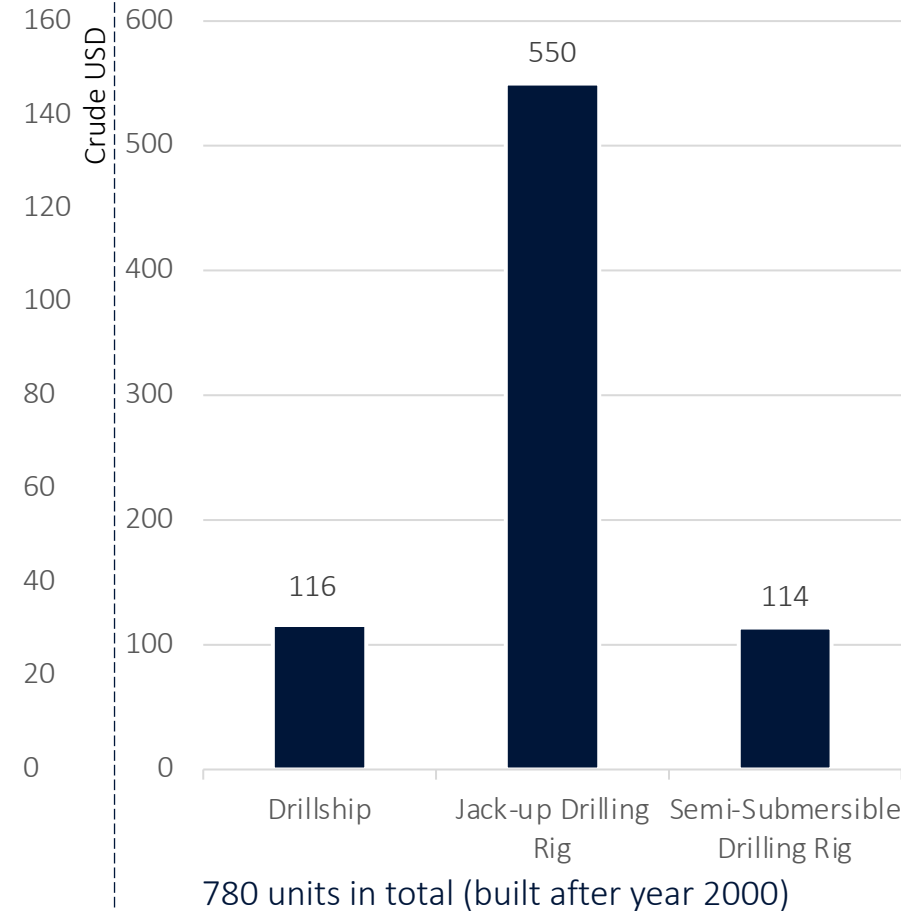
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# Drilling Vessels World Wide

## Fleet age by build year & crude price



## Vessel categories

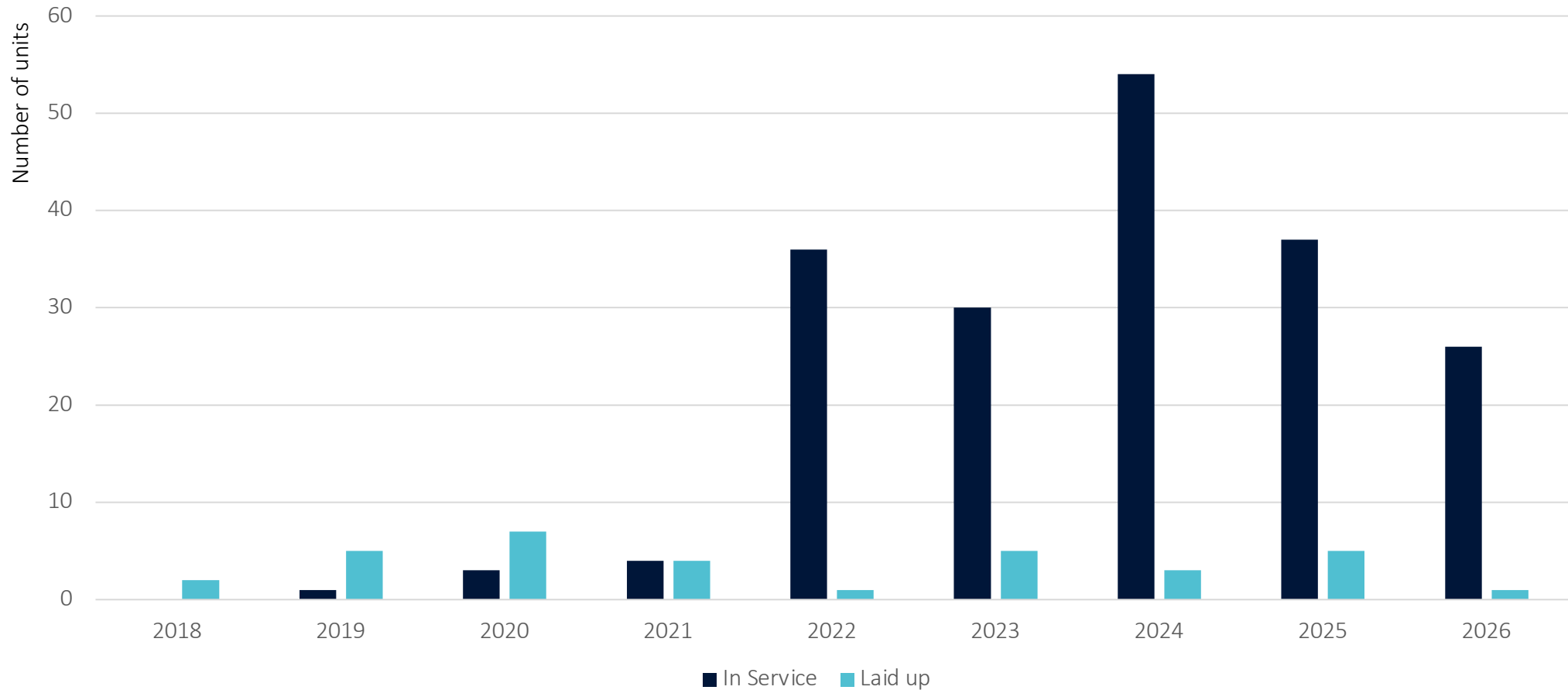




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# Drilling Vessels World Wide

Special Periodic Survey (SPS) per year – Units in KM Fleet



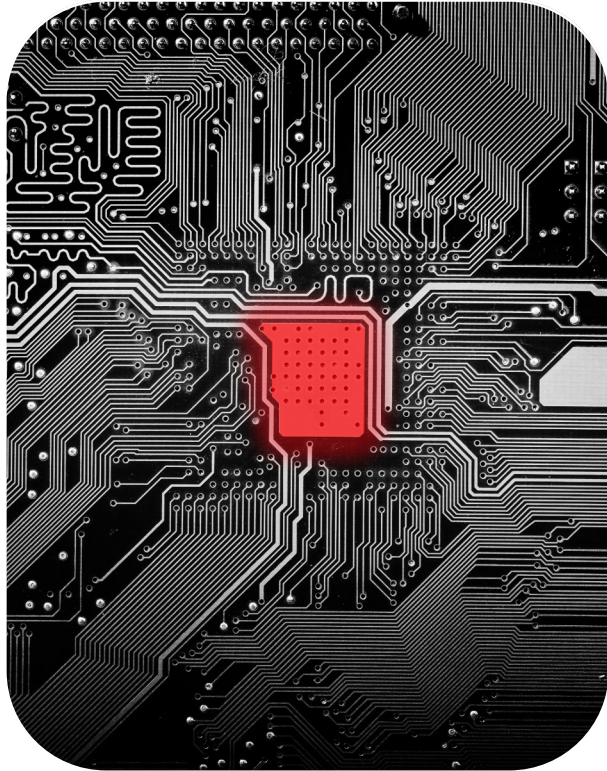


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# Long Term Planning of Maintenance

Why is it even more important than ever?

Semiconductor shortage



Inflation



Increased activity



Max utilization of engineers

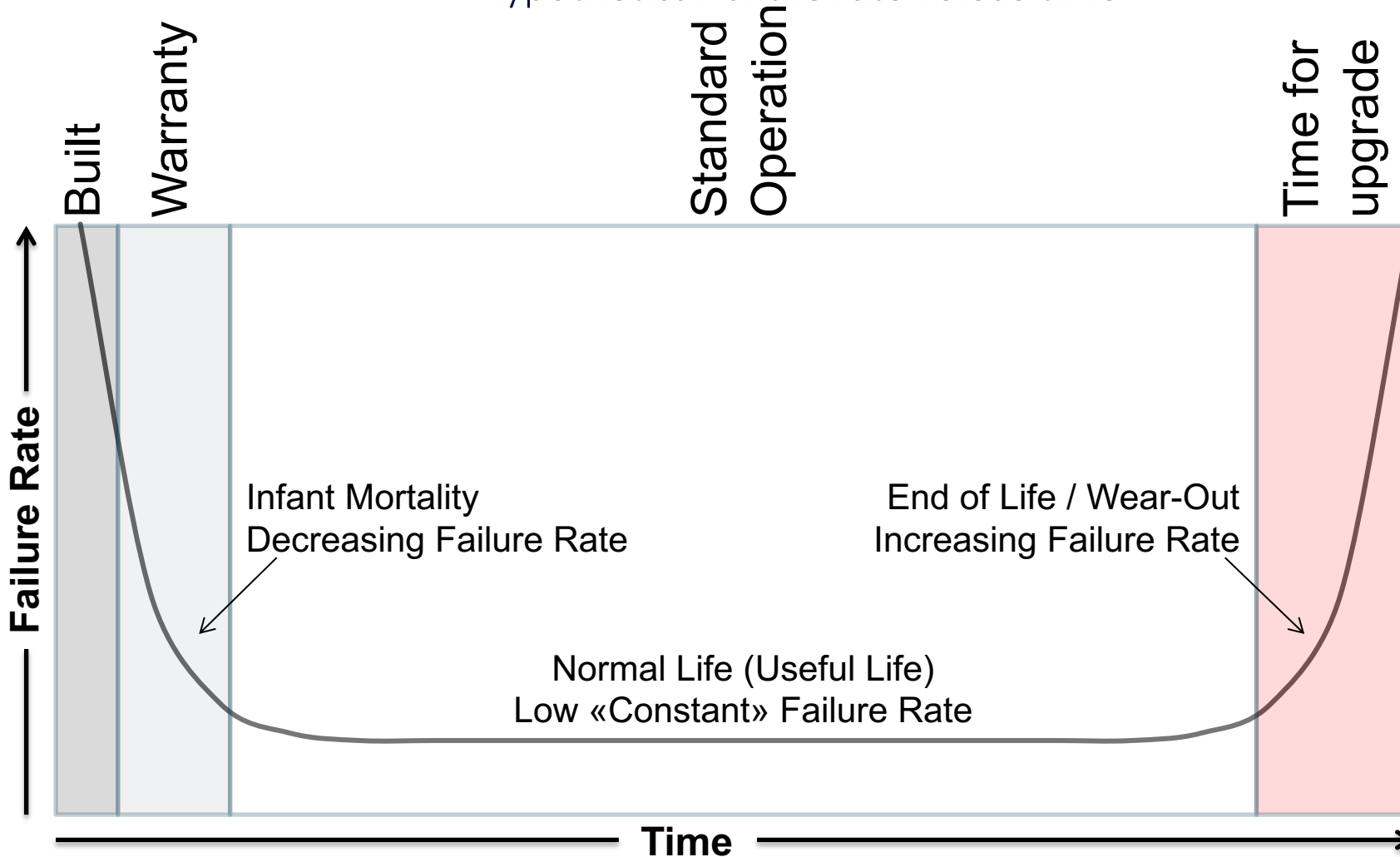




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# The Bathtub Curve – Why Upgrade DP Now

Hypothetical failure rate versus time

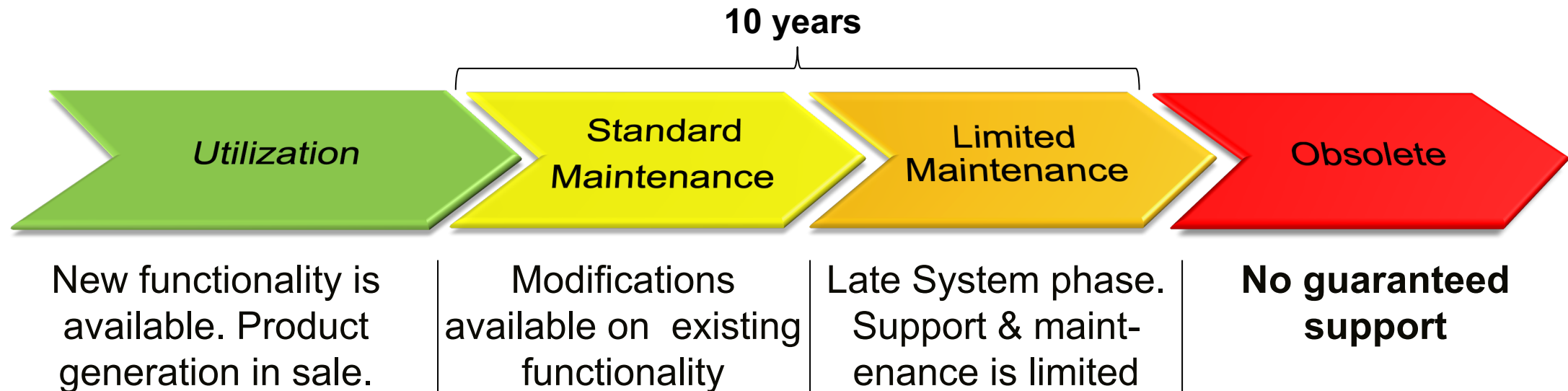




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# Lifecycle Management

Kongsberg Maritime Definitions



*Development of new functionality is happening on the latest software versions.*

*An upgrade during SPS means you are ready for future environmentally friendly solutions.*



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# SPS Planning

Involve KM to plan for SPS's 10-15 years ahead

	System	Details																		First SPS Recommendations		
		Version	Windows	RCU	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036		2037	
Vessel 1	Built 2009						15 yrs						20 yrs					25 yrs				
	K-Pos	8.4.1.0	Win10	602			SPS						SPS					SPS				None
	K-Chief OS	7.3.27	Win XP				SPS						SPS					SPS				Performance Maintenance to K-Chief 8.8.x and Win 10
	K-Chief PS	7.3.27		500/510			SPS						SPS					SPS				Performance Maintenance to K-Chief 8.8.x and Win 10
	K-Bridge	N.A	NA				SPS						SPS					SPS				Performance Maintenance to K-Bridge 8.x and Win 10
K-Thrust	2.x	Win XP	500/510			SPS						SPS					SPS				Performance Maintenance to K-Thrust 720	
Vessel 2	Built 2015						10 yrs						15 yrs					20 yrs				
	K-Pos	8.1.3	XP	501				SPS					SPS					SPS				Performance Maintenance to K-Pos 8.4.x and Win 10
	K-Chief OS	8.6.5	XP					SPS					SPS					SPS				Enhanced Maintenance to K-Chief 8.8.x and Win 10
	K-Chief PS	8.6.5		502				SPS					SPS					SPS				Upgrade to RCU 602 highly recommended due to low spare time
	K-Bridge	7.1.5	7	502				SPS					SPS					SPS				Performance Maintenance to K-Bridge 8.x and Win 10
K-Thrust	3.3.1		502				SPS					SPS					SPS				K-Thrust 720 Retrofit	
Vessel 3	Built 2016							10 yrs						15 yrs				20 yrs				
	K-Pos	8.1.3	XP	501					SPS					SPS				SPS				Performance Maintenance to K-Pos 8.4.0 and Win 10
	K-Chief OS	8.7.3	7						SPS					SPS				SPS				Enhanced Maintenance to K-Chief 8.8.x and Win 10
	K-Chief PS	8.7.3		502					SPS					SPS				SPS				Upgrade to RCU 602 highly recommended due to low spare time
	K-Bridge	7.1.5	7	502					SPS					SPS				SPS				Performance Maintenance to K-Bridge 8.x and Win 10
K-Thrust	3.4.2	7	502					SPS					SPS				SPS				K-Thrust 720 Retrofit	
Vessel 4	Built 2018					5 yrs						10 yrs					15 yrs					
	K-Pos	8.4.4.0	Win 10	602			SPS					SPS					SPS					None
	K-Chief OS	8.7.4	Win 7				SPS					SPS					SPS					Enhanced Maintenance to K-Chief 8.8.x and Win 10
	K-Chief PS	8.7.4		502/602			SPS					SPS					SPS					None
	K-Bridge	7.1.5.58	Win 7	502			SPS					SPS					SPS					Performance Maintenance to K-Bridge 8.x and Win 10
K-Thrust	3.3		502			SPS					SPS					SPS					Enhanced Maintenance to K-Thrust 3.4	



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# Improving Efficiency

## Low hanging fruits



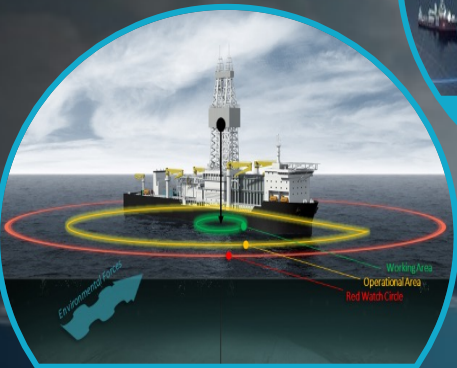
Energy Management System

Est. Savings: 5-10%



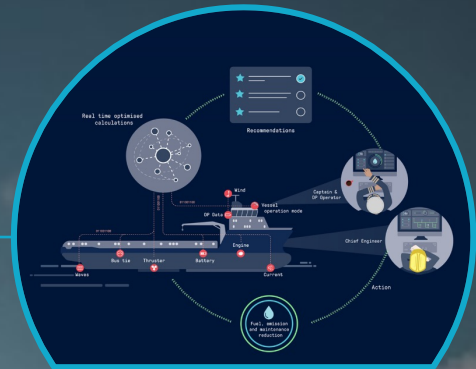
DP Digital Survey

Est. Savings: 0,5%



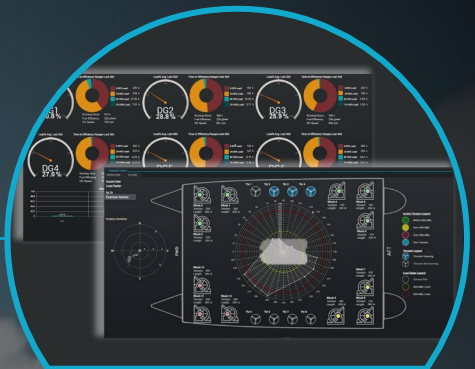
Enhanced Green DP

Est. Savings: 2-5%



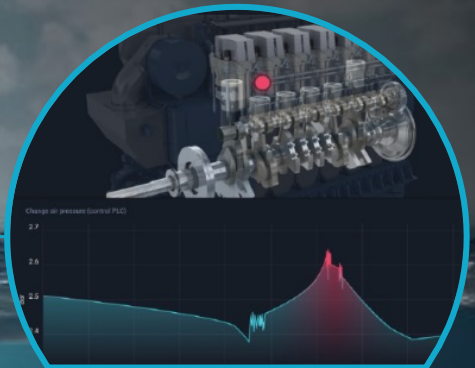
EcoAdvisor

Est. Savings: 2-6%



Energy Awareness Dashboards

Est. Savings: 1-4%



Condition Monitoring

Reduce Maintenance

Total Est. Savings: 8-20%





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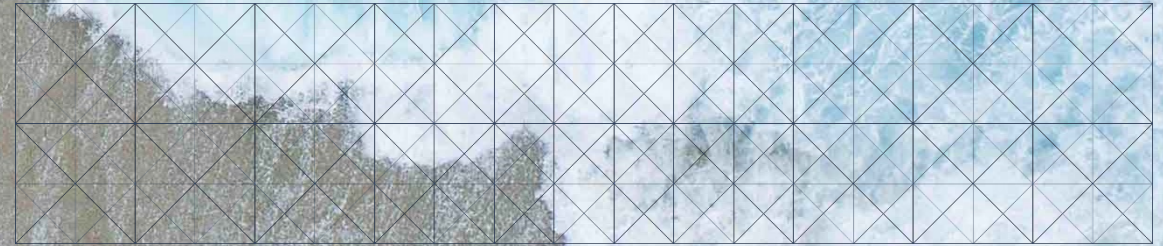
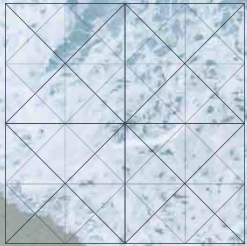
**Short contracts:  
Focus on low hanging fruits**

**Long contracts:  
Focus on optimized solutions**

**Thanks**

Maximizing performance by providing

**THE FULL PICTURE**

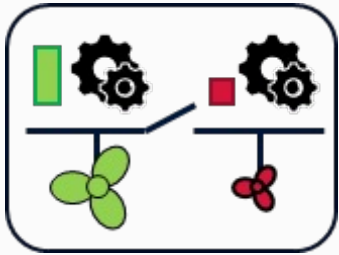




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# KM's Predictive Energy Management & Control

Significant savings implemented only by software



## Dynamic Inertia Control (DIC)

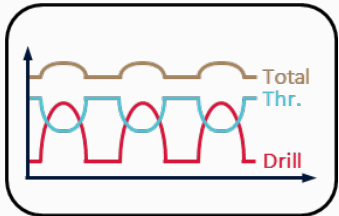
Consumers (e.g. thrusters or drilling) adjusted for the producer's load step capabilities (kW/s) at any give moment

With the DIC's calculated kW/s availability per SWBD, load can also be dynamically moved from one SWBD to another by DP or drilling



## Dynamic Load Predictions (DLP)

Load predictions from consumers (e.g. thrusters or drilling) will be used to pre-load the producers (proactive control & no turbo lag)



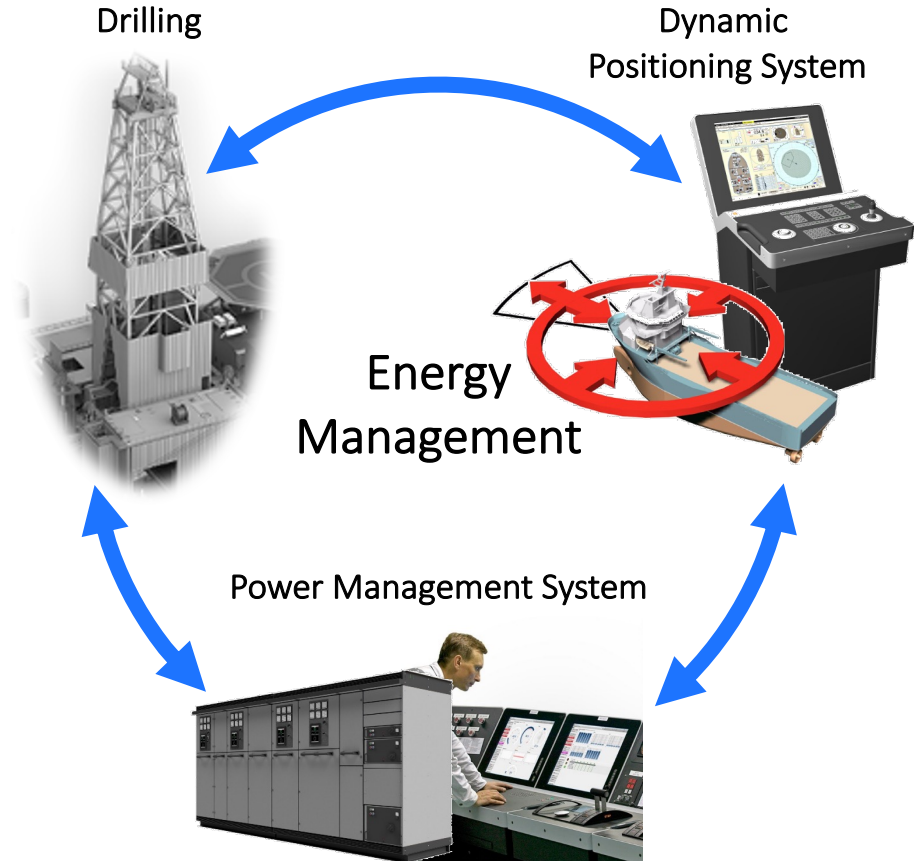
## Dynamic Load Compensation (DLC)

The Dynamic Load Compensation function uses special thrusters allocation module to compensate for large load variations in other heavy consumers



## In combination with KM Energy Storage System

Dynamics handled optimally by DG's and consumers → Less loss of energy in/out of battery & increased battery lifetime



All enabled by integration of systems



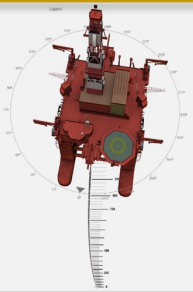
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# Limit Power Fluctuations for Station Keeping

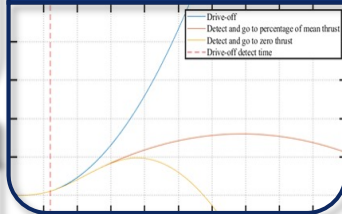
Enhanced Green DP enabled by integrated DP and Riser Management System

## THE ENABLERS

### Riser Management System



### Drive Off Detector & Arrestor

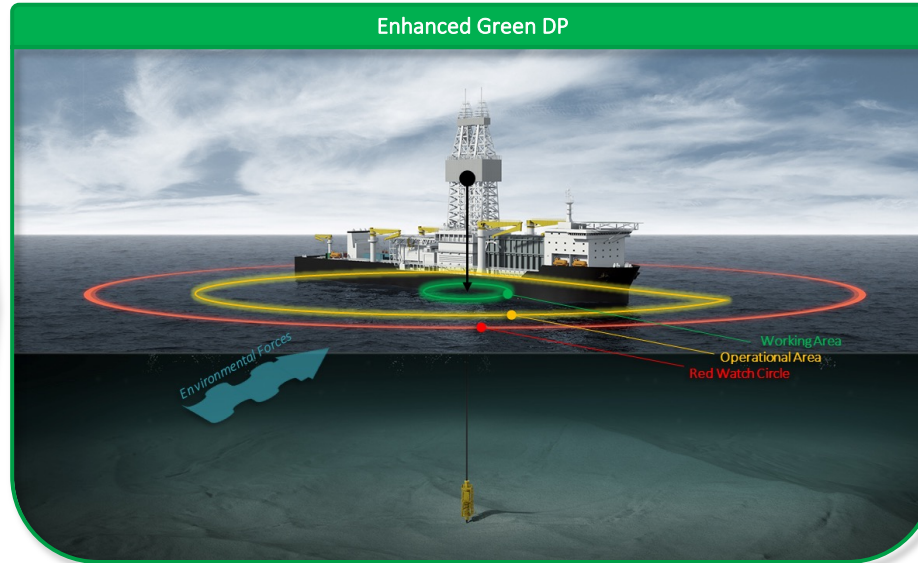


### Electronic WSOG

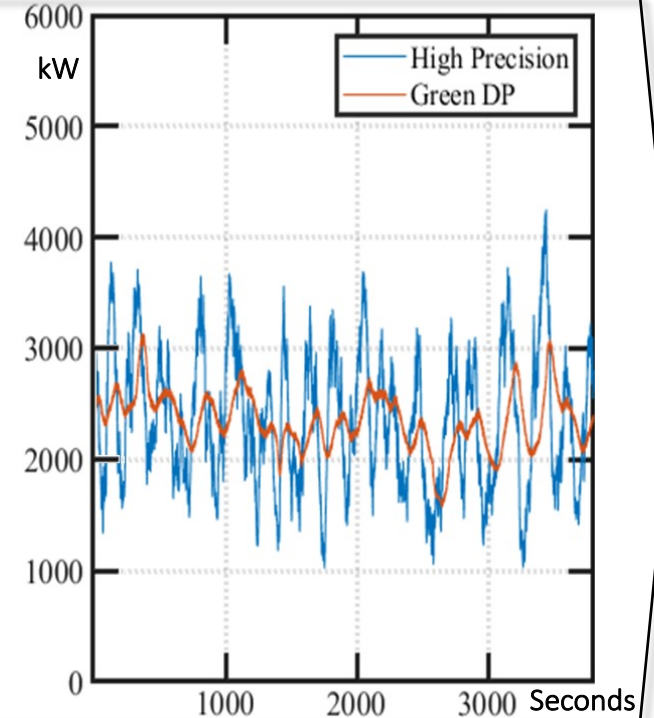


## THE TOOL

### Enhanced Green DP



## THE RESULT



- Eliminate Drive-off risk
- Optimized rig position to reduce wear and tear
- Reliable and maximized dynamic watch circle input to enhanced Green DP

- Reduce station keeping requirements allowing controlled safe vessel excursions

- Optimized and smooth station keeping power demand

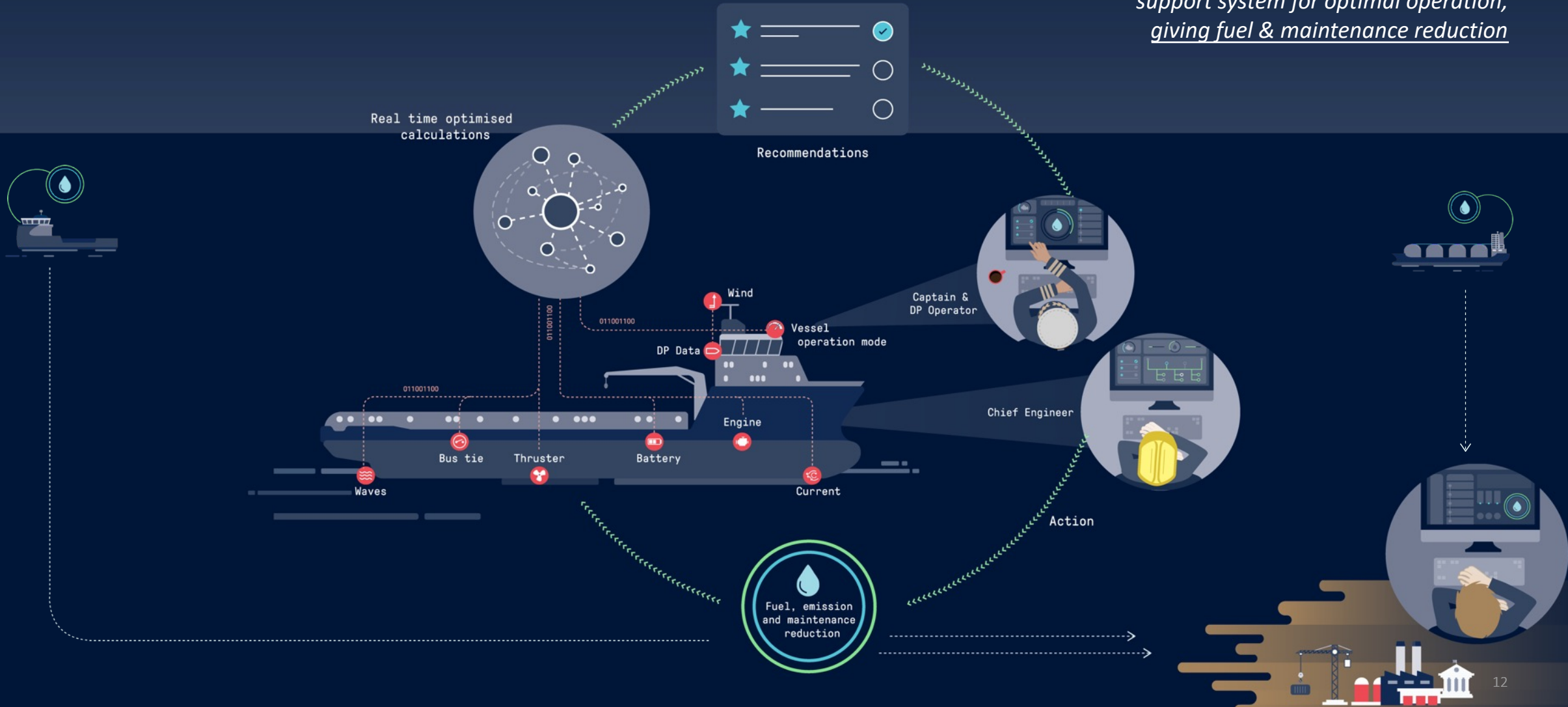


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SAVE THE ENVIRONMENT  
REDUCE COSTS  
STEPPING STONE TOWARDS AUTONOMY

# EcoAdvisor™

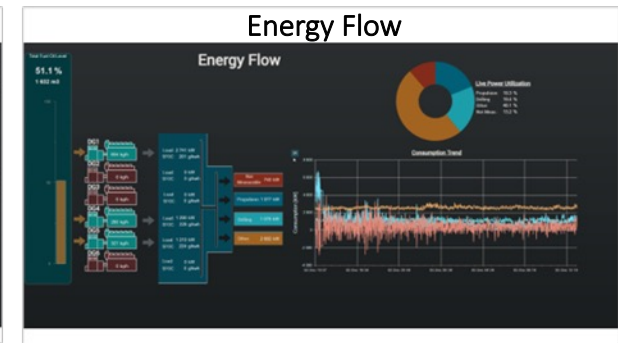
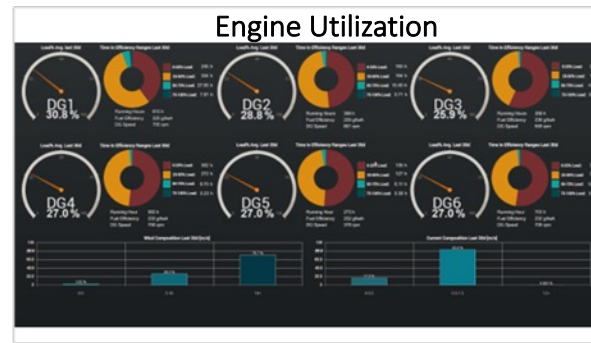
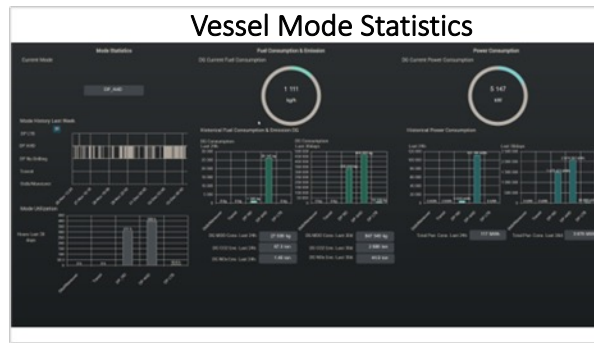
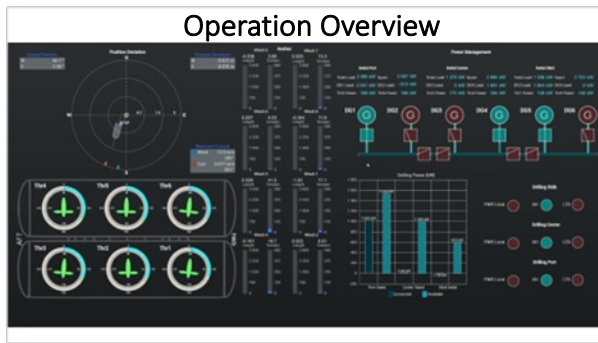
*A proactive and intelligent decision support system for optimal operation, giving fuel & maintenance reduction*



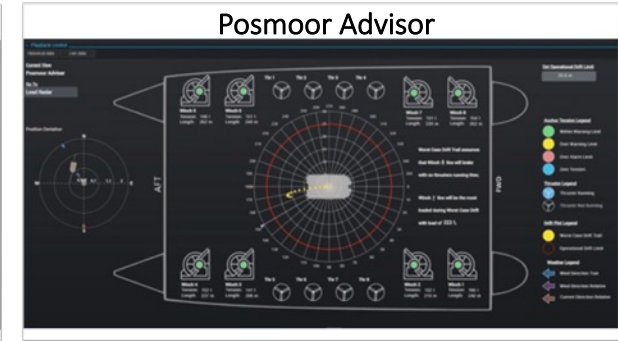
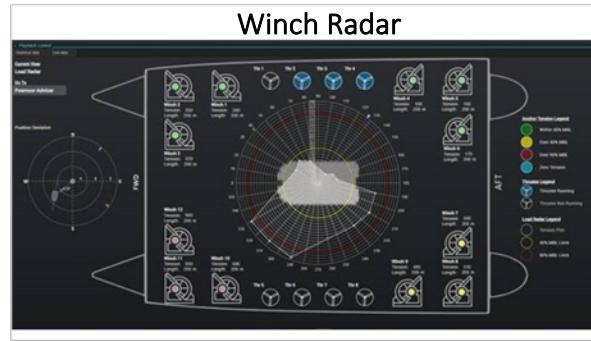
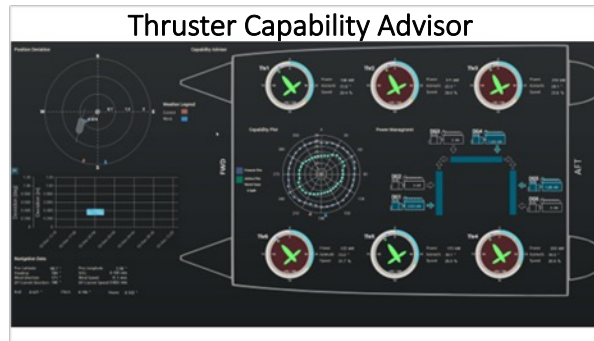
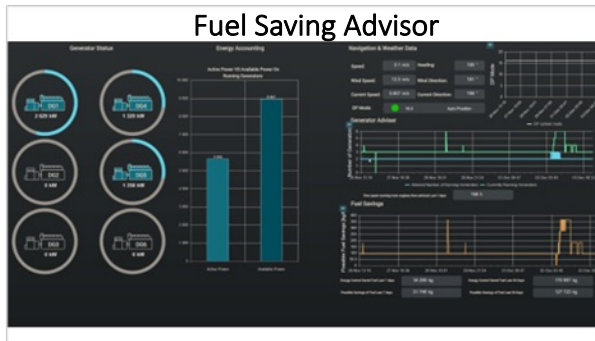
# K-IMS Information Management System

Dashboards for Operational Awareness, Guidance and Performance Monitoring

## Operational Awareness and Performance Monitoring Dashboards



## Guidance and advisory Dashboards





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# DP Digital Survey

Process Cycle

DPDS

## 1. Planning

Surveyor and Owner plans each Annual Trial

## 2. Preparation

Captain plans a start date for each test

## 3. Execution

The tests are executed when possible within the given timeframe

## 4. Reporting

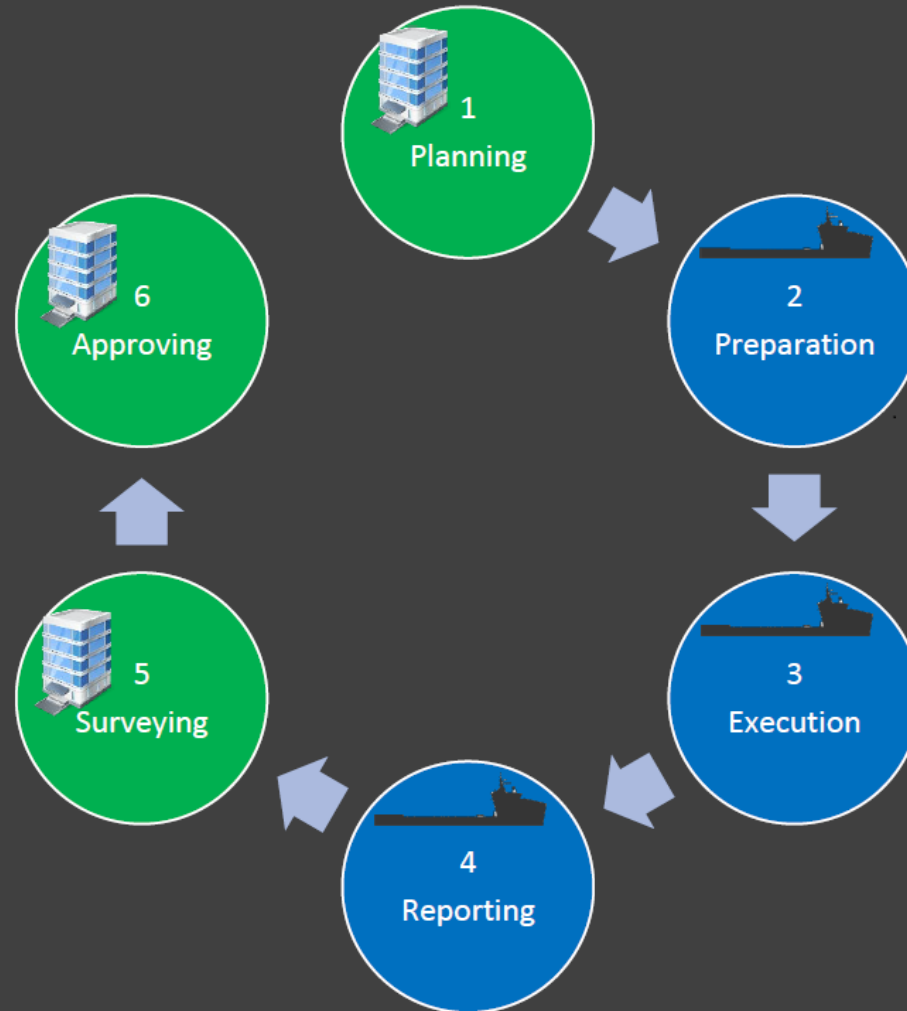
Captain generates report when all tests for the Annual Trial is completed and sends it to surveyor.

## 5. Surveying & Data Verification

Surveyor receives the reports and starts playing back each test for evaluation  
3rd party Data Quality Verification

## 6. Approving

Surveyor approves/disapproves each test and issues certificate



Onshore Activity

Offshore Activity