

Harnessing digital solutions for enhanced marine operations

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BUREAU
VERITAS

SUMMARY



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INTRODUCTION



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DIGITAL SOLUTIONS



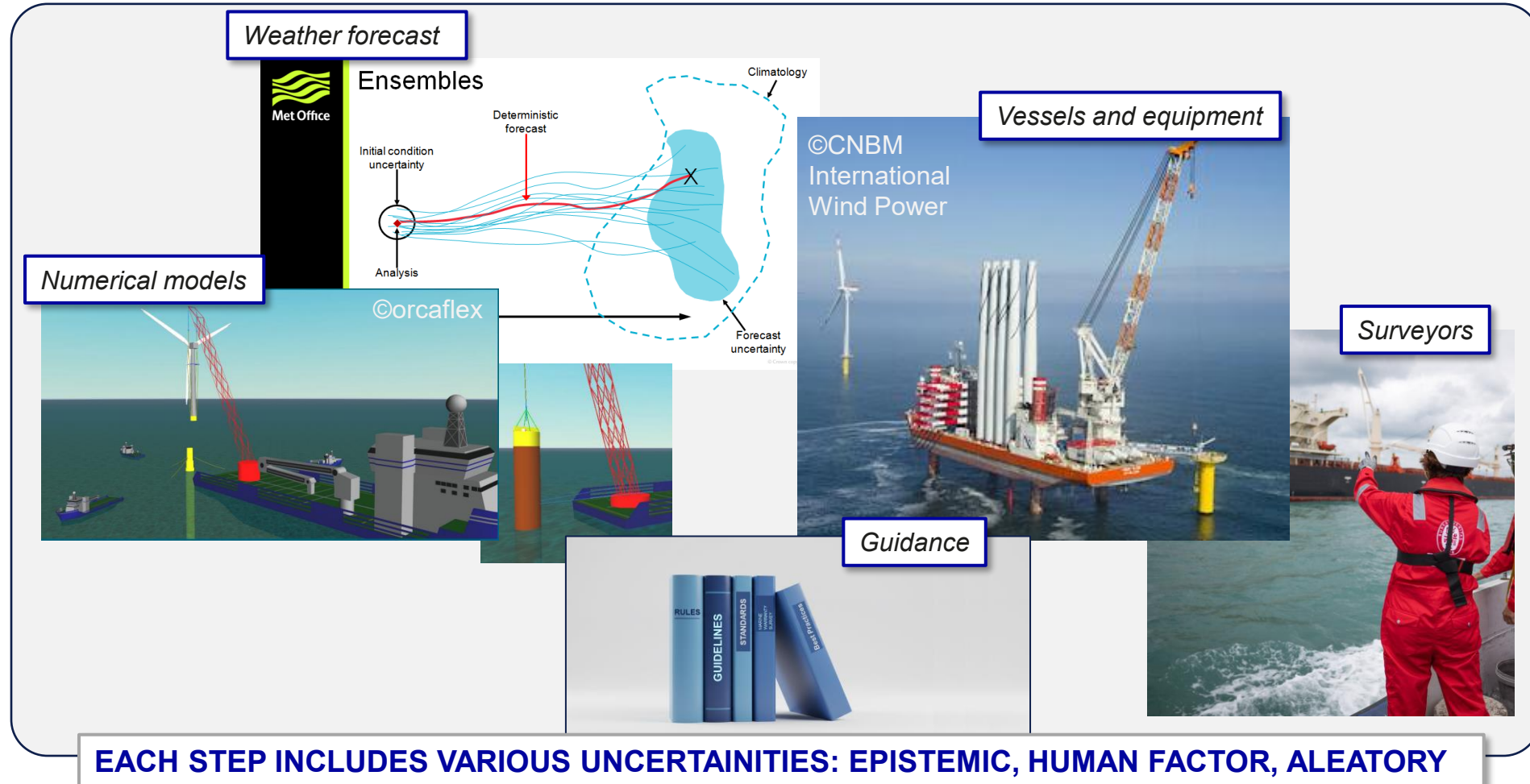
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HOW TO SHAPE A
WORLD OF TRUST

INTRODUCTION

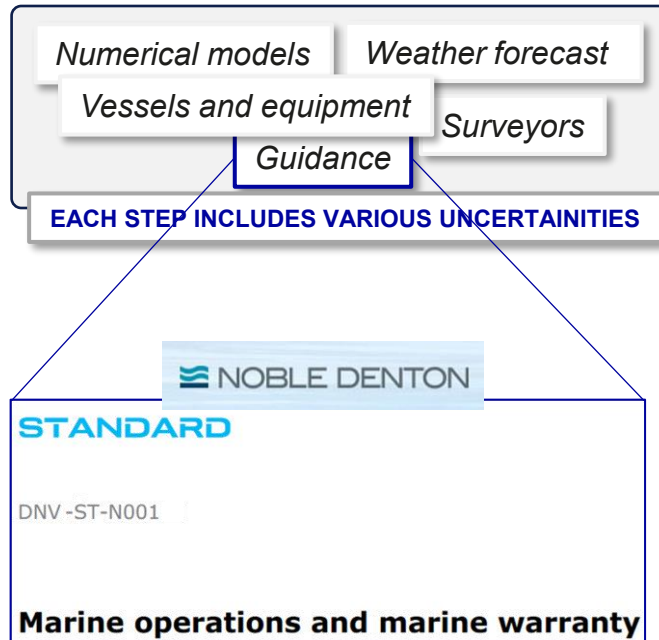
PRACTICES, PRESCRIPTIVE REQUIREMENTS, and EXISTING STANDARDS

Offshore Operations refer to the full range of coordinated activities & missions on, under, or over the world's seas.



INTRODUCTION

Example of uncertainty factors in existing standards



Nobel Denton's standard N001 covers most offshore assets and operations that are likely to require MWS approval.



How to unlock the use of digital solutions as alternative to prescriptive requirements for marine operations?

Alpha factor – applies to the 'operational limiting criteria' to account for weather forecasting inaccuracies.

Planned operation period [h]	Operational limiting (OP_{LIM}) significant wave height [m]						
	$H_s = 1$	$1 < H_s < 2$	$H_s = 2$	$2 < H_s < 4$	$H_s = 4$	$4 < H_s < 6$	$H_s \geq 6$
$T_{POP} \leq 12$	0.72	Linear interpolation	0.84	Linear interpolation	0.87	Linear interpolation	0.88
$T_{POP} \leq 24$	0.69		0.80		0.84		0.86
$T_{POP} \leq 36$	0.68		0.78		0.80		0.84
$T_{POP} \leq 48$	0.66		0.75		0.78		0.81
$T_{POP} \leq 72$	0.61		0.69		0.75		0.79

When environmental monitoring is considered, the alpha factors increase slightly.

Guidance note:

The tabulated alpha factors are based on the work performed in a Joint Industry Project during the years 2005-2007 with the aim to establish a revised set of α -factors for European waters.

Marine Operation Rules, Revised Alpha Factor JIP Project.

DIGITAL SOLUTIONS

WHERE HAVE THE R&D DIRECTIONS BEEN?



Digital workspace (realistic simulators)

Prediction of the environmental conditions

Specialist models (physics and/or data-driven)

Monitoring and guidance systems (sensors and cameras)

Motion compensators and feed-forward systems

Remote operation centers | USV

DIGITAL SOLUTIONS

UNCOVERING WAYS TO REVOLUTIONISE HOW WE APPROACH MARINE OPERATIONS

NEXT

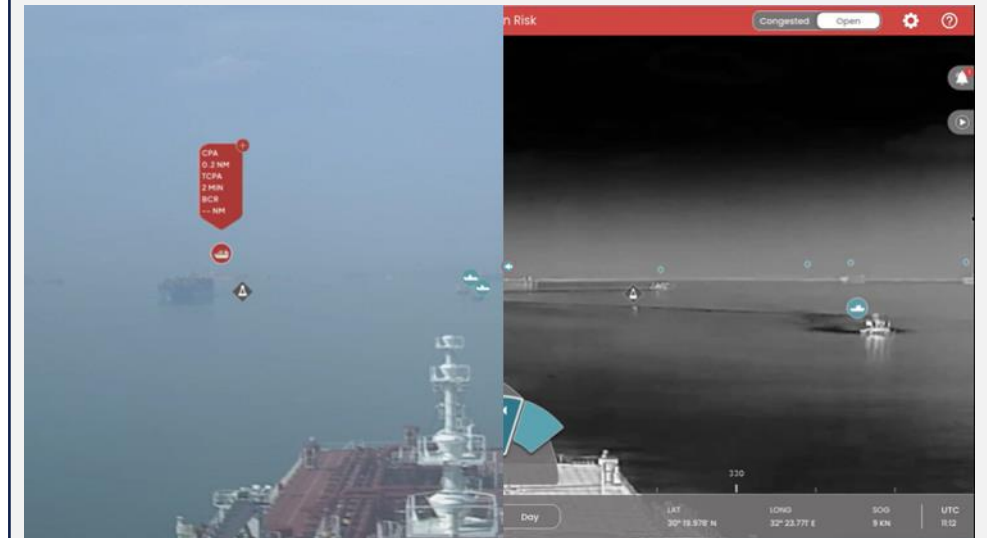
OCEAN

- Predict ship motions wave-by-wave
- Provides decision support to offshore operations minutes ahead of time.

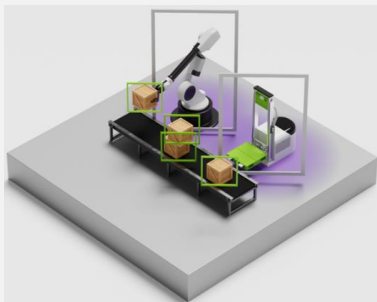


ORCA AI

Smarter, real-time decisions from the bridge



Using the Power of AI to Make Factories Safer



- Automatically monitoring dangerous zones, ensuring that workers wear proper gear, etc.



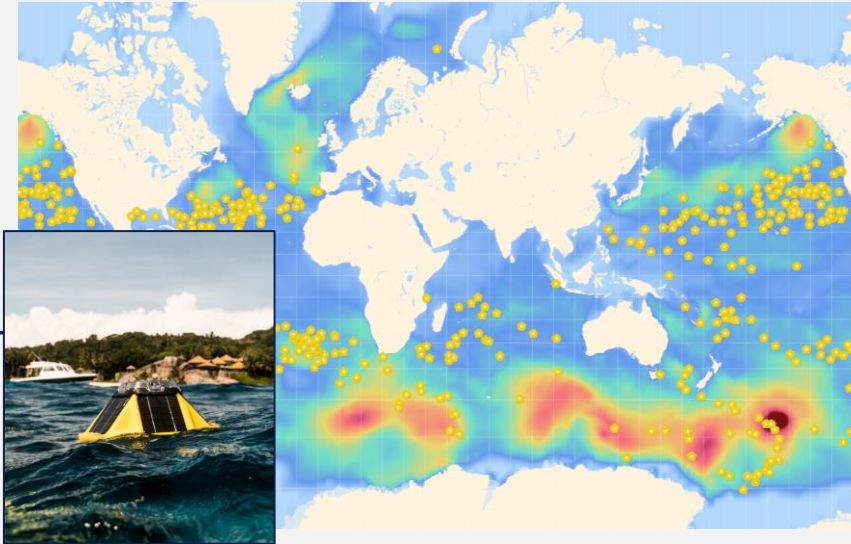
CAMERA SYSTEMS AND RADARS

DIGITAL SOLUTIONS

UNCOVERING WAYS TO REVOLUTIONISE HOW WE APPROACH MARINE OPERATIONS



- World's largest private network of real-time ocean sensors.
- Over 1.5 million real-time observations per day.
- Improving the accuracy up to 50%.

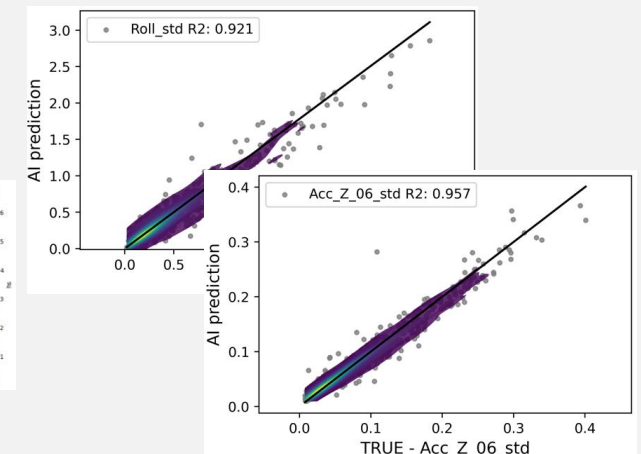
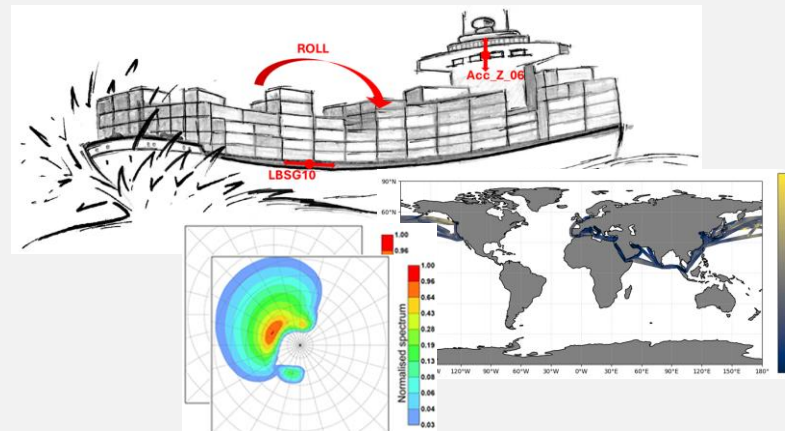


USV solution towards remotely supervised maritime operations



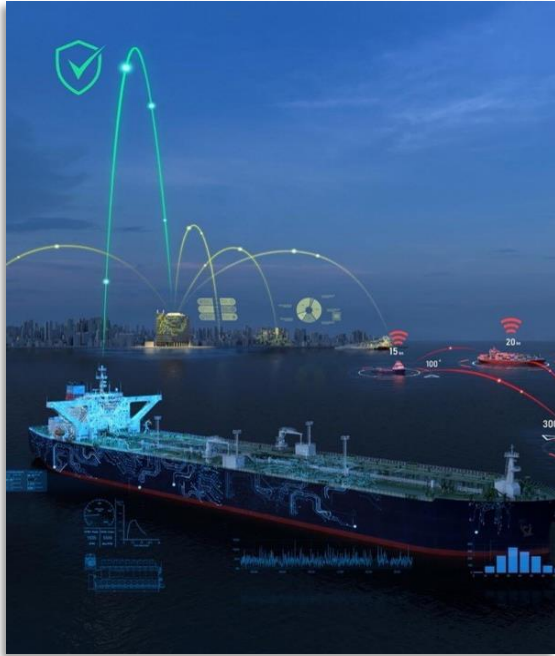
DATA-DRIVEN DIGITAL TWIN MODEL

- Aims at reducing the uncertainties in the numerical models.
- Uses measured wave-induced responses and encountered environmental conditions to learn how the vessel responds under different scenarios.



DATA ANALYTICS AND FORECASTS

HOW TO SHAPE A WORLD OF TRUST?



- ONLY WHAT GETS MEASURED, GETS MANAGED

- *(Peter Drucker)*

- SMART SHIPS

- Focus is on using technology, processes, and people to achieve pre-defined objectives.
 - Safer and secure through resilient software, robust data infrastructure and cybersecurity.

- AUGMENTED DECISIONS

- The transformative potential of digital solutions in enhancing decision-making should be viewed as a booster for human capabilities, not a replacement.
(Haavard Oestnsen, Kongsberg Digital – TomorrowShow 2024)

Notwithstanding Digital Solutions' capabilities, there are a few aspects of paramount importance:

Regulatory framework

- Several international and national regulations are already in place.
- BV NI692 Guidelines for ML/AI

Trustworthiness

data governance, transparency & explainability, robustness, replicability, confidence interval, etc.

Risk assessment

Digital solutions must be continuously monitored and updated to ensure compliance.



Let's discuss:

How to unpack the digital solutions to augment our decision-making capabilities?