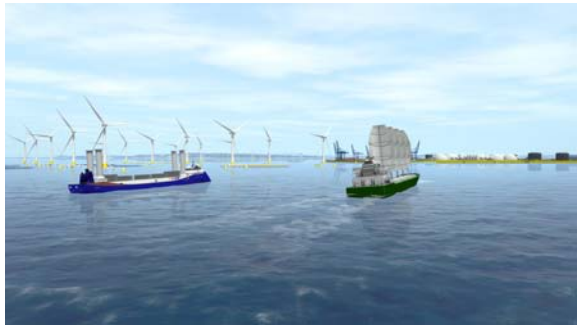
Group Discussion ‘Digitization with focus on ITTC aspects’

Contribution: Dr. Bas Buchner (President MARIN)

Future challenges of the maritime sector



Energy transition

Safe shipping

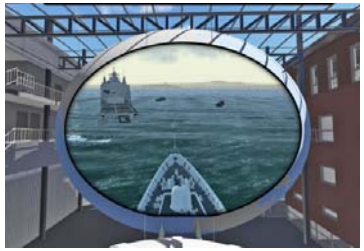
Digitalisation

Robotisation

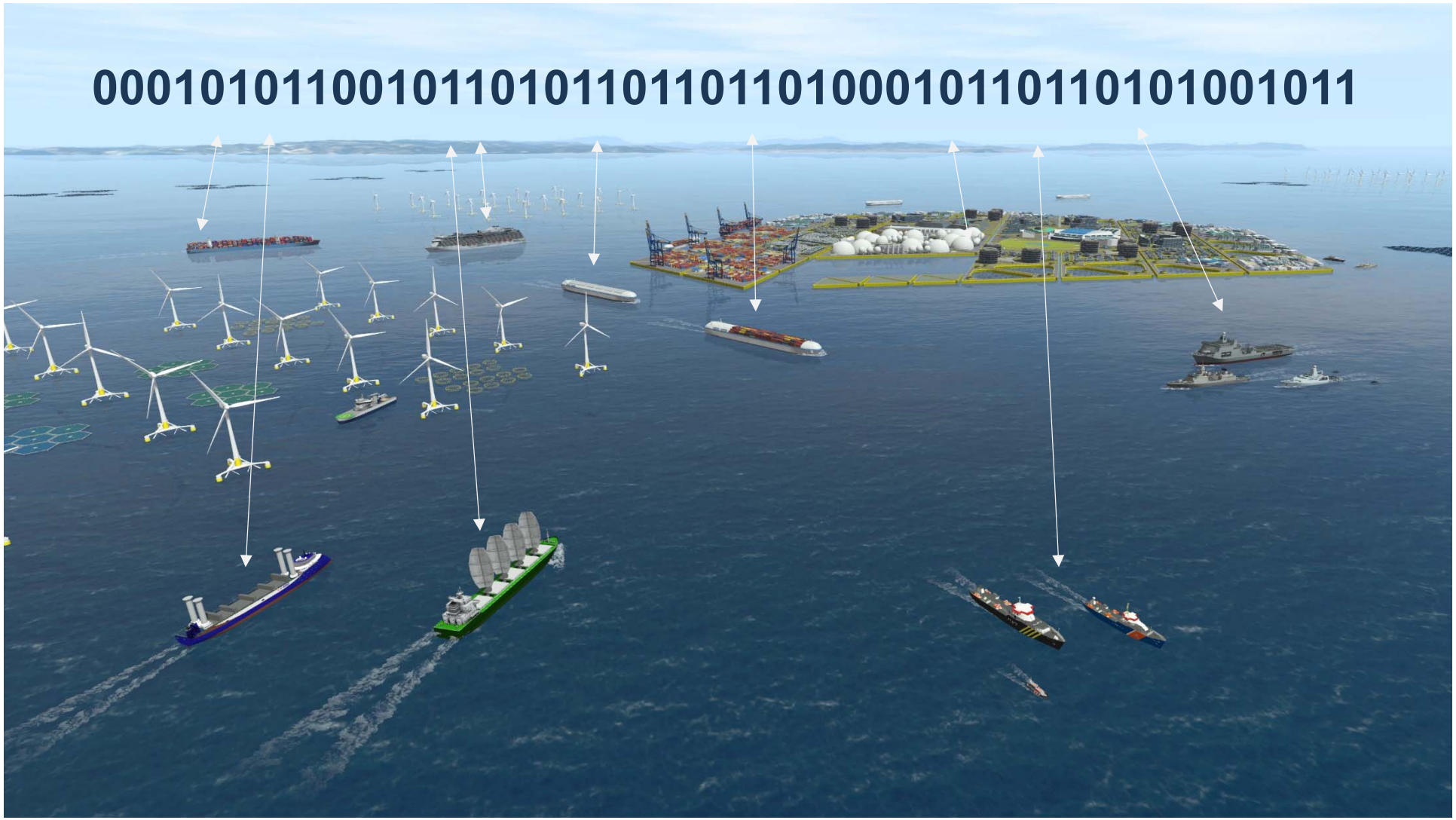
‘MAKING SHIPPING MORE CLEAN, SAFE AND SMART’

Chain of hydrodynamic tools

CONCEPT ⟷ DESIGN ⟷ OPERATION



Simulation	**Testing**	**Simulators**	**Monitoring**
Desk / Computer	Prototype	Virtual reality	Big data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Digital tools

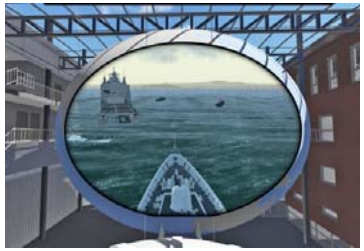
CONCEPT ⟷ DESIGN ⟷ OPERATION

Simulation

Desk / Computer

Testing

Prototype



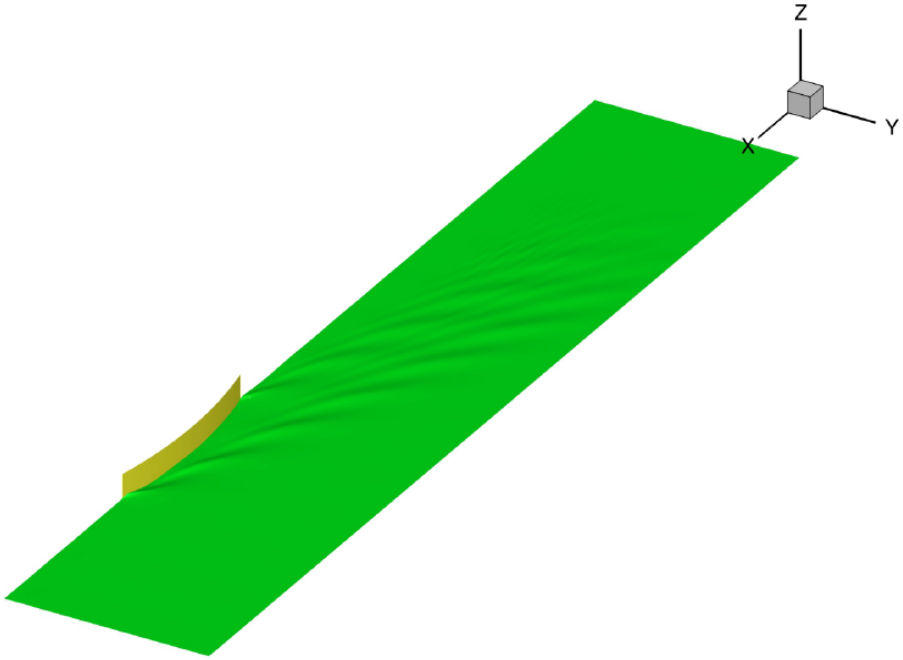
Simulators

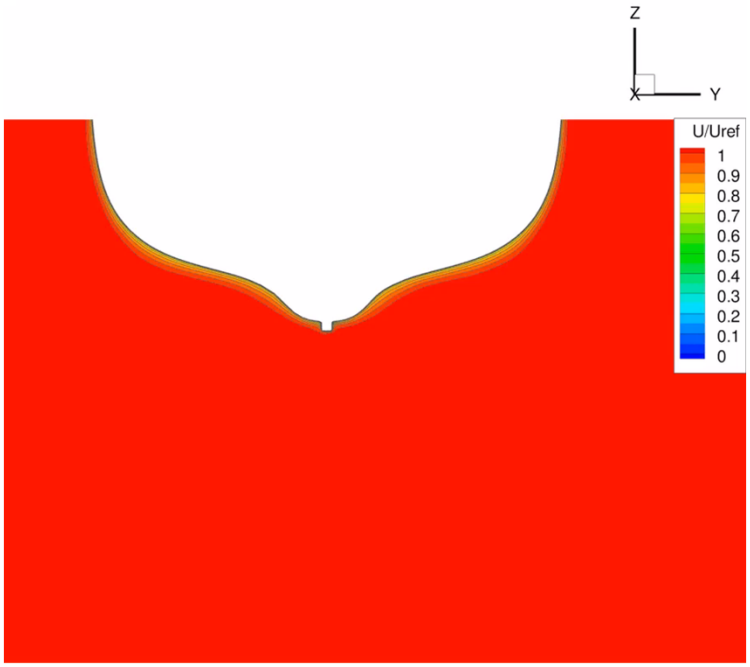
Virtual reality

Monitoring

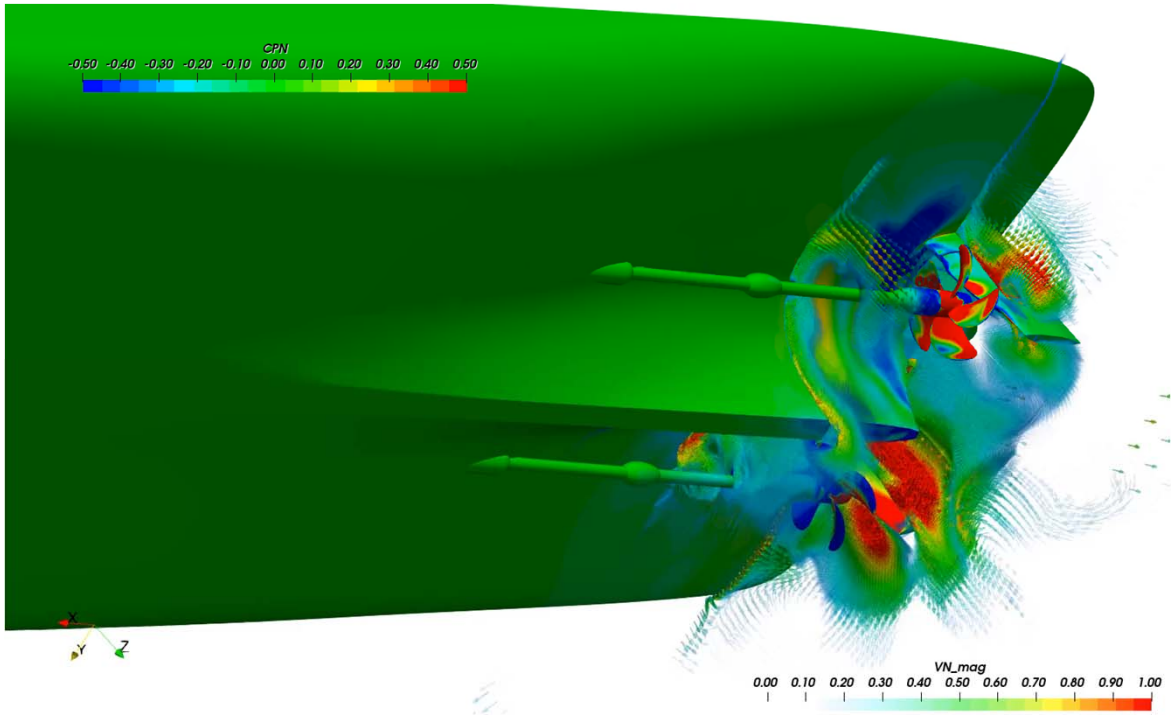
Big data

2011: CFD Wigley hull en axial wake

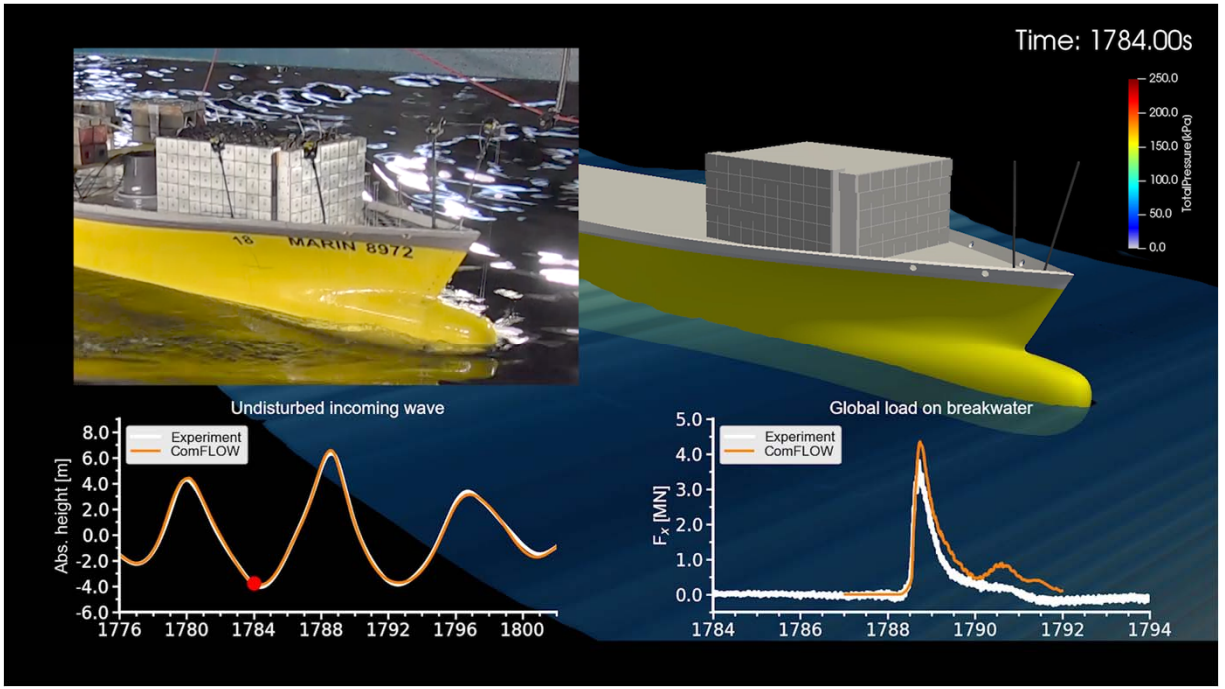




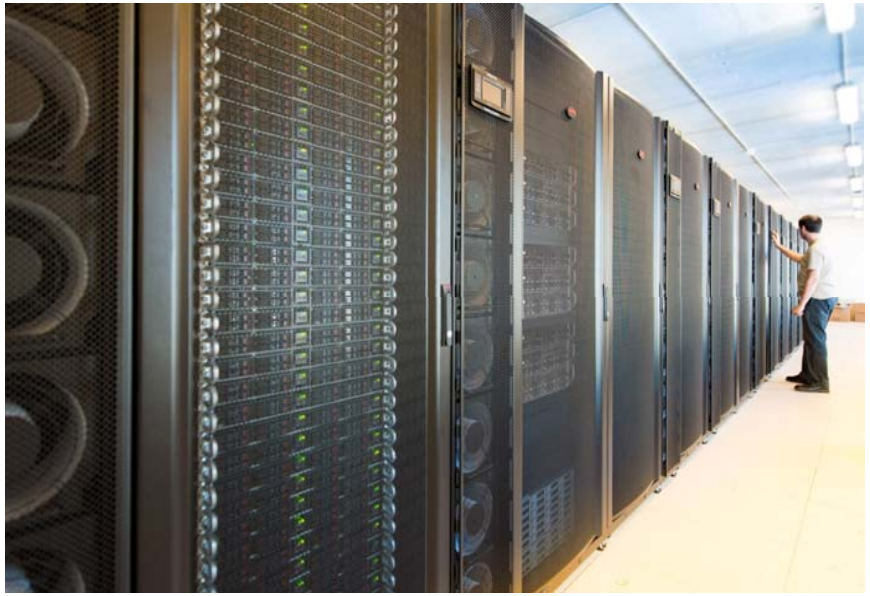
2021: CFD (ReFRESCO) with rotating thrusters



2021: CFD (ComFLOW) with waves and green water



Cluster: Marclus 1-3 (10-1800 cores) to Marclus 5 (10000)



Trends around us, beside CFD

- Simulation-based design, Digital twins
- Virtual reality, Augmented reality, Serious gaming
- Large amounts of data (Big Data), Artificial Intelligence, Machine learning



Model testing, CFD en then…

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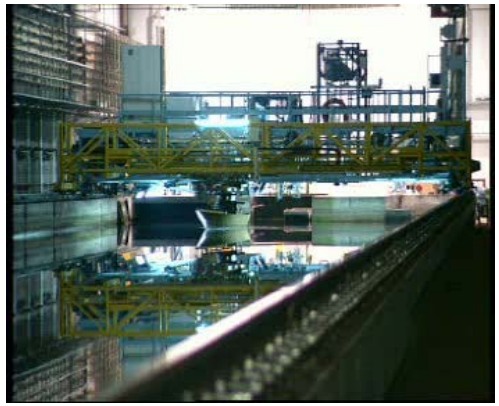
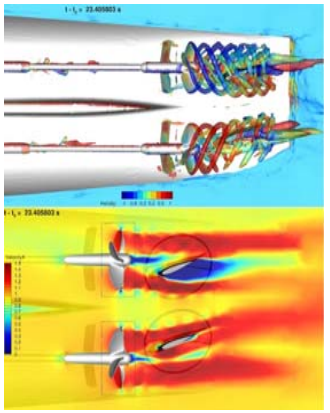
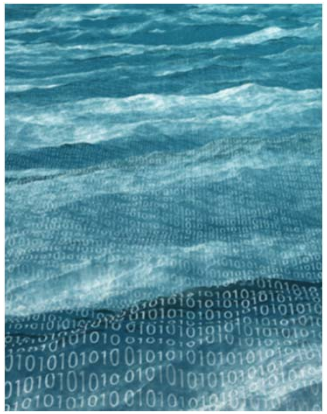


Model testing, CFD en then…



Digitization with focus on ITTC aspects

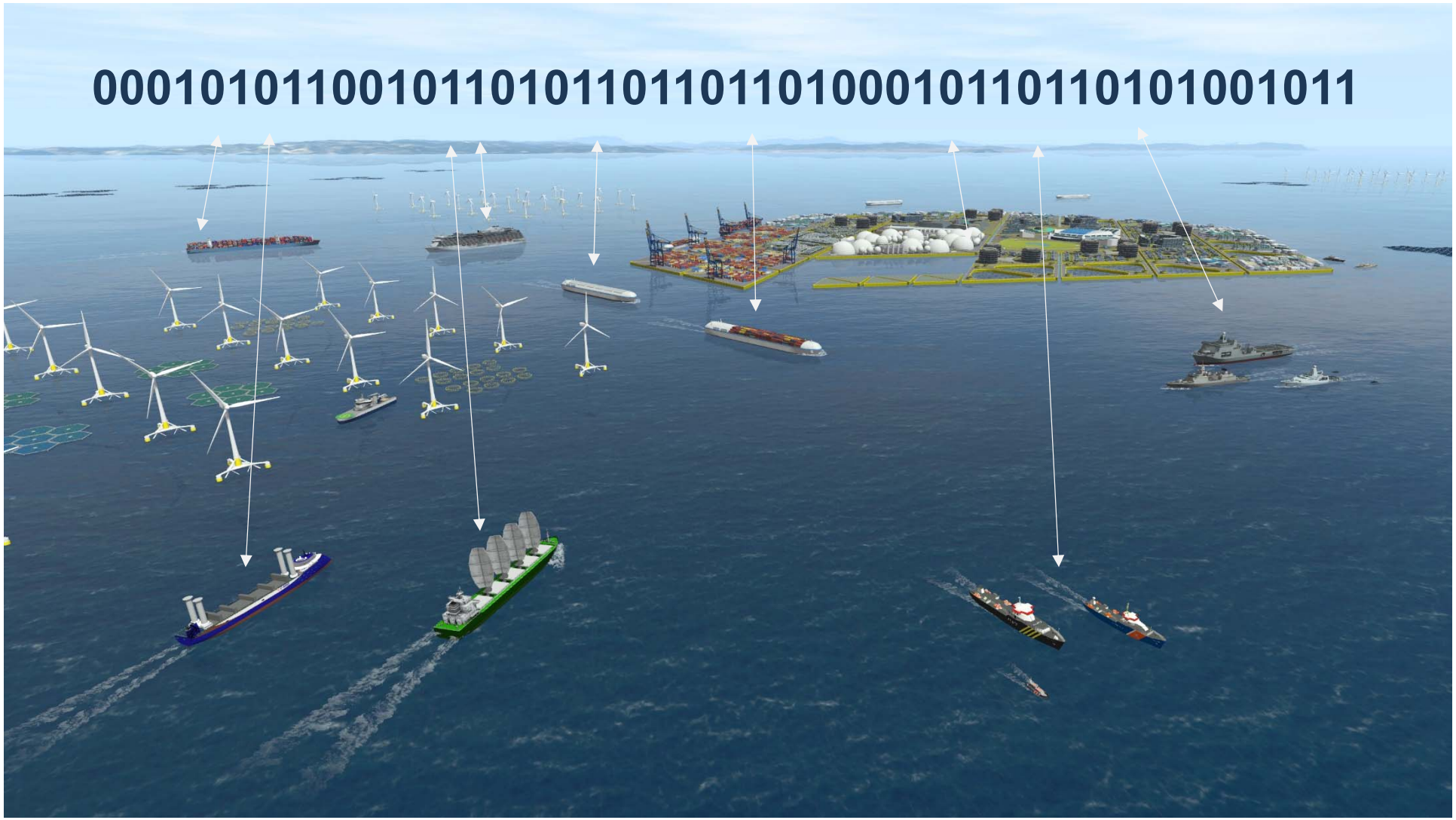
- ITTC is the QA organisation for hydrodynamic research: accurate answers for our clients: clean, safe and smart ships in operational conditions.
- Hydrodynamic research is broader than model testing.
- Digitalisation/data put the focus on the right topic: performance in operatoonal conditions.
- But digitalisation is not new to us: data analysis, CFD and (frequency and time domain) simulations.
- But what is our role?

Digitization with focus on ITTC aspects

- ITTC should remain the QA organisation for hydrodynamic research: accurate answers for our clients: clean, safe and smart ships in operational conditions.
- Digitization requires other types of expertise: CFD, simulations, data science.
- We do not have all that expertise ourselves now…
- Hoe do we develop that expertise?
- We should extend of membership to other parties that perform hydrodynamic research. But who?

Specific challenges:

- There is a big challenge QA for CFD and data science compared to model testing: water molecules are the same everywhere, numerical models and data algorythms are not. How do we deal with that?
- What is the quality of the data and how do you define that?
- What is the ‘explainability’ of data driven solutions?
- Do data driven solution provide predictions?
- How do we get (safe) access to data?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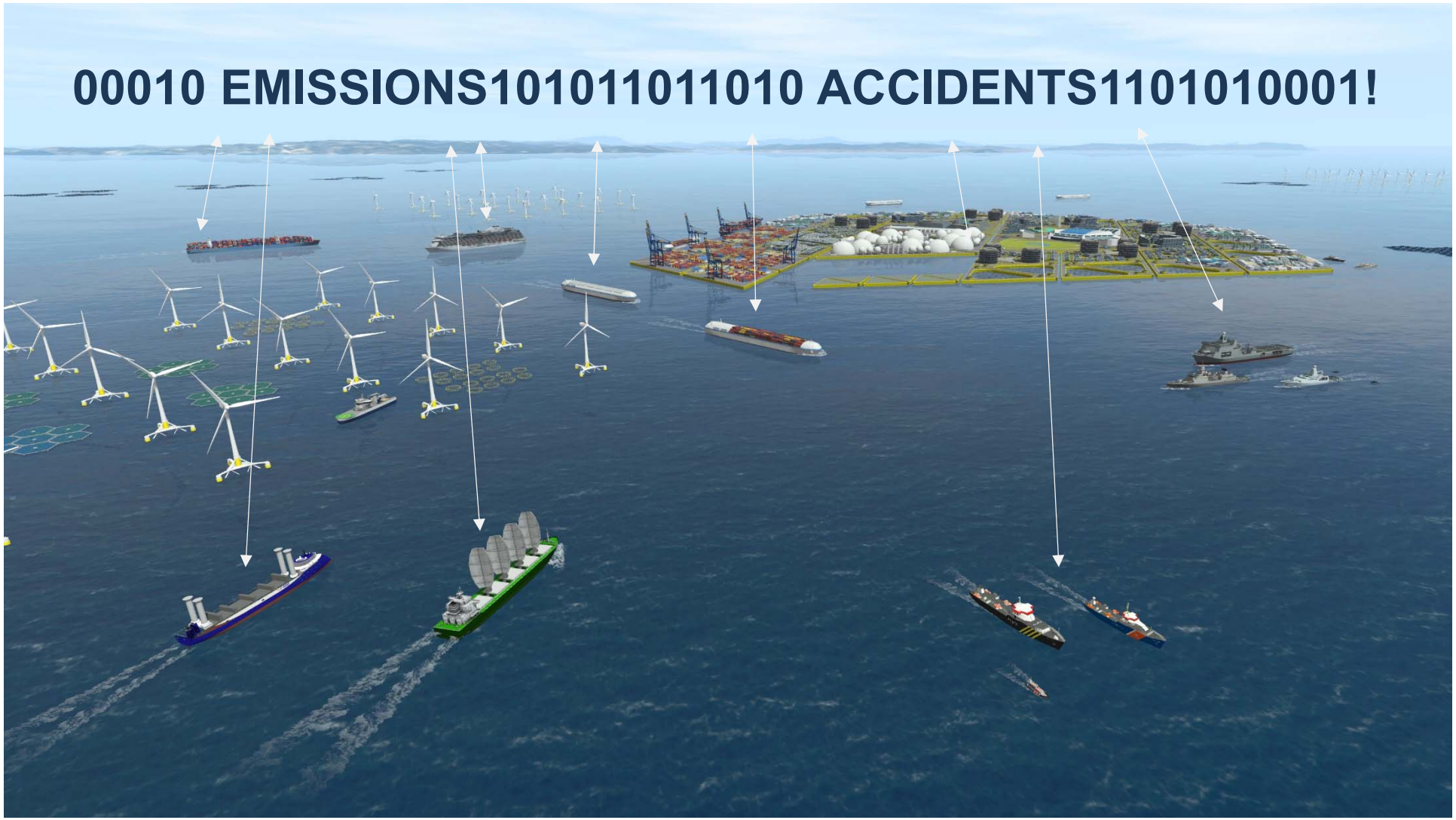
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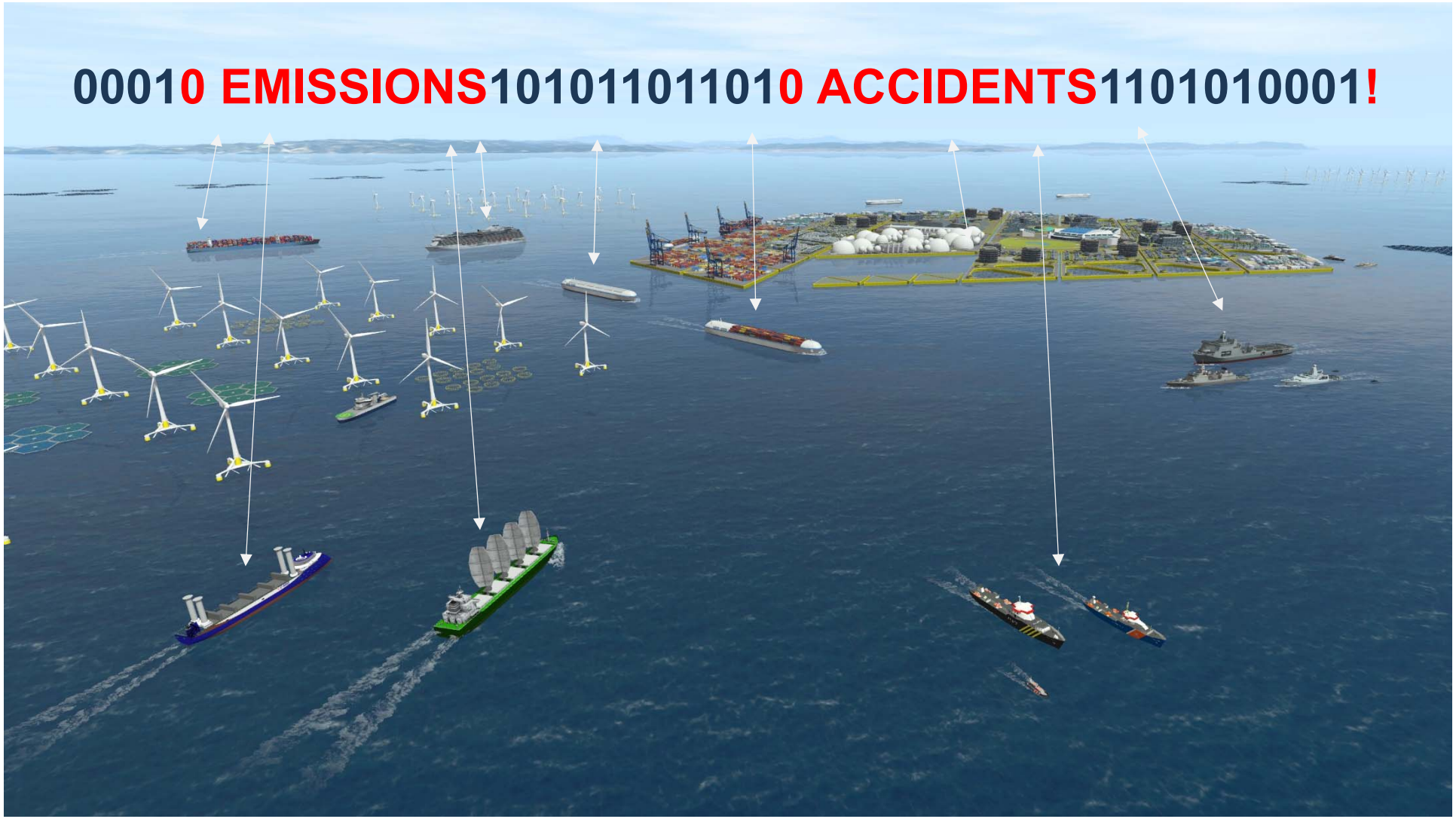
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