

The background image shows a ship's deck with a stack of colorful shipping containers on the left. The sea extends to the horizon under a sunset sky. A digital overlay of binary code (0s and 1s) is projected onto the water's surface, creating a sense of digital navigation or data flow.

Globally optimal design of ship energy systems

Zou Guangrong

Ship energy system conceptual design is to find **the optimal among a myriad of design scenarios**, technically challenged by

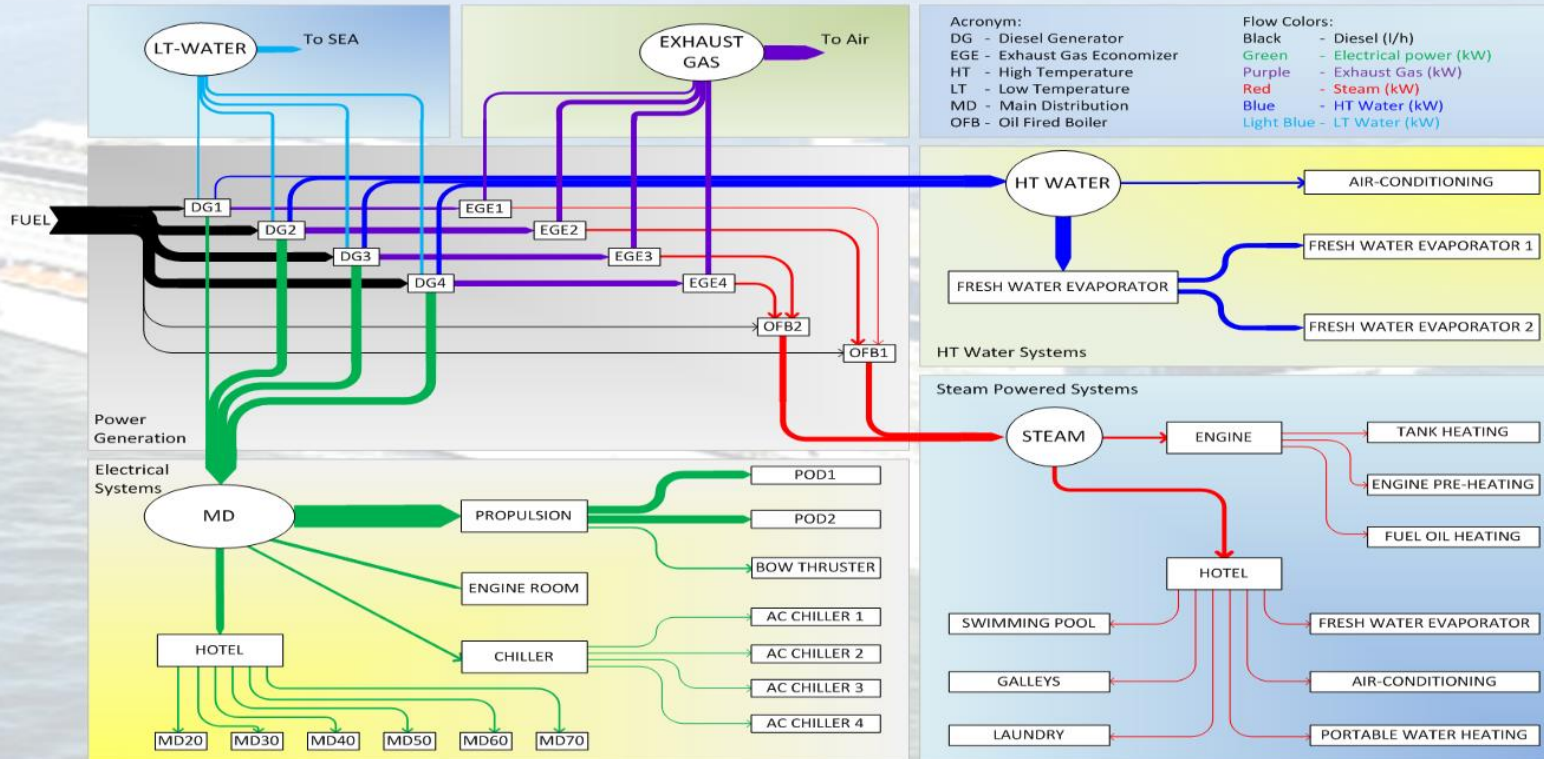
- **increasingly large complexity**

- the inclusion of enormous number of components

- **high degree of uncertainties**

- inadequate or inaccurate information about the systems and their dynamic operating environment

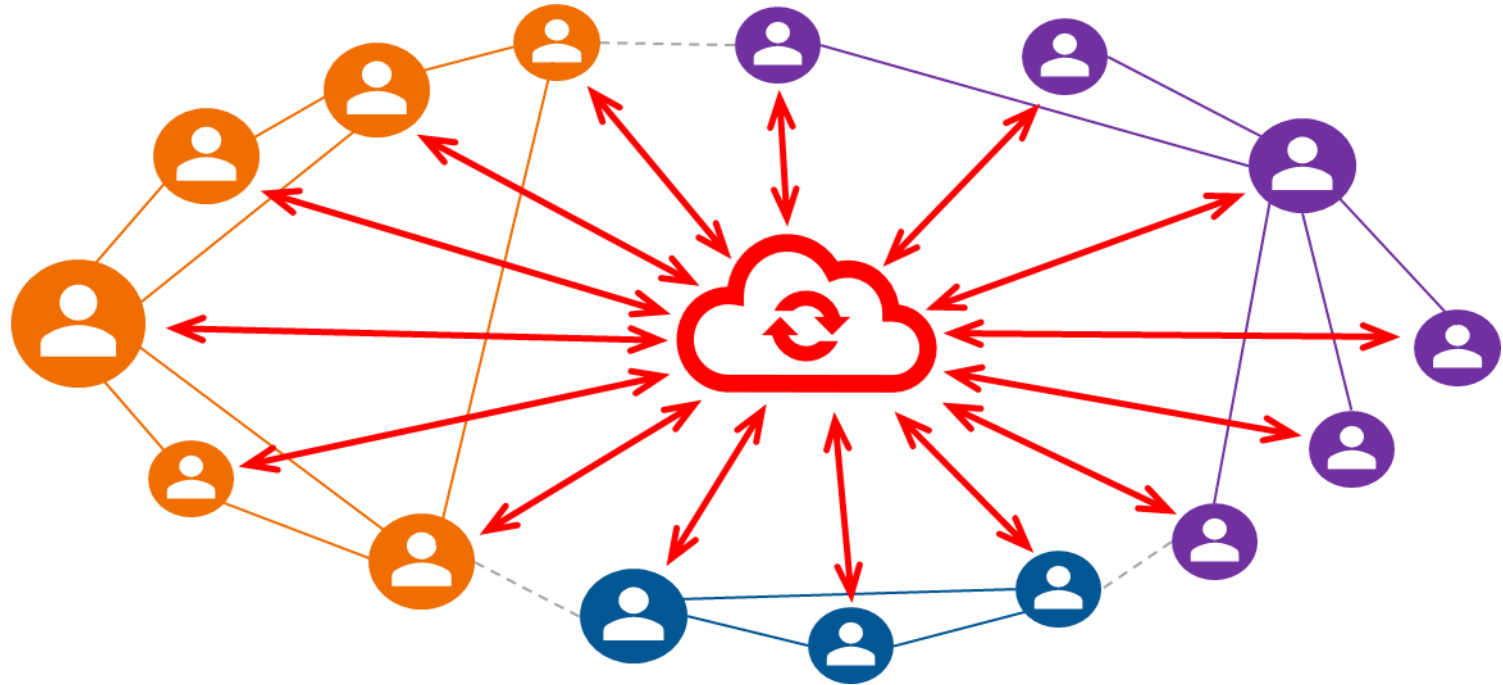
What makes it complex is **all the components** are **interconnected** to form a micro energy grid



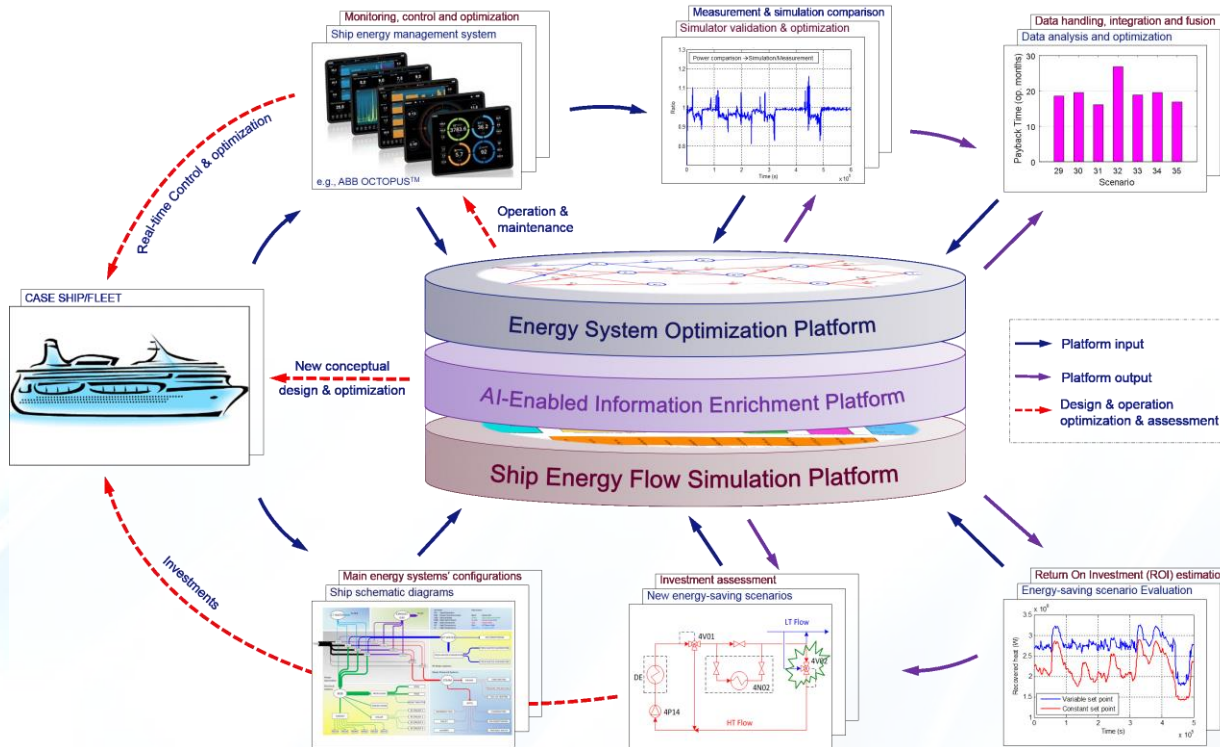
How could **digitalization**
help better support
ship energy system design?



Innovative cloud-based framework for collaborative design and optimization



Ship energy system design and operation optimization (NDOO) – DIGITAL by DESIGN

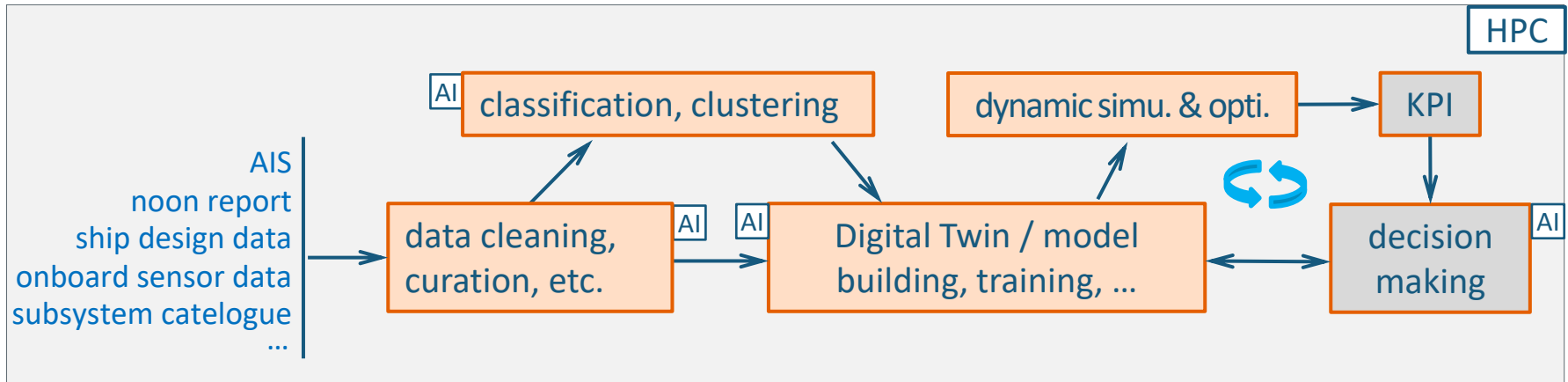


Model-based energy system design and operation optimization

Data-driven energy system design and operation optimization

Novel energy-saving technology solutions and innovations

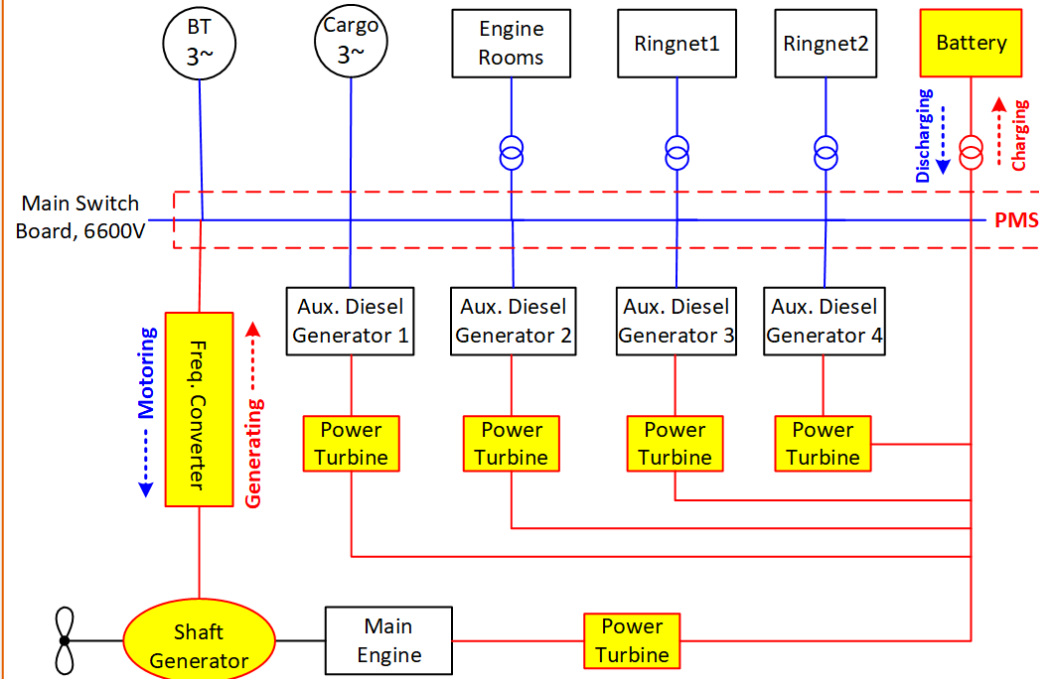
Incorporate *AI, Big Data, HPC and digital twin* in the loop of system design process to *automatically* explore design space against real operating conditions



Ship energy system design and operation optimization (NDOO) – Demo

Scenario (Ship owner/operator):

- Your business is growing
- You plan to add new ship(s) to your current fleet to meet the increased demand
- You've been told several novel technologies are promising
- Before making decisions, you want to know their real-life benefits, BUT HOW?



Key Take-Away

Digitalization can
engage collaboration to
achieve **better** performance
significantly **cheaper** and **faster**

Smart & Green Shipping Together



bey⁰nd

the obvious

ZOU Guangrong

+358 40 766 8565

guangrong.zou@vtt.fi