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**BLUE RESEARCH &
INNOVATION DAYS**

BRINGING EUROPEAN AND NATIONAL PROJECTS
ON BLUE ECONOMY TOGETHER

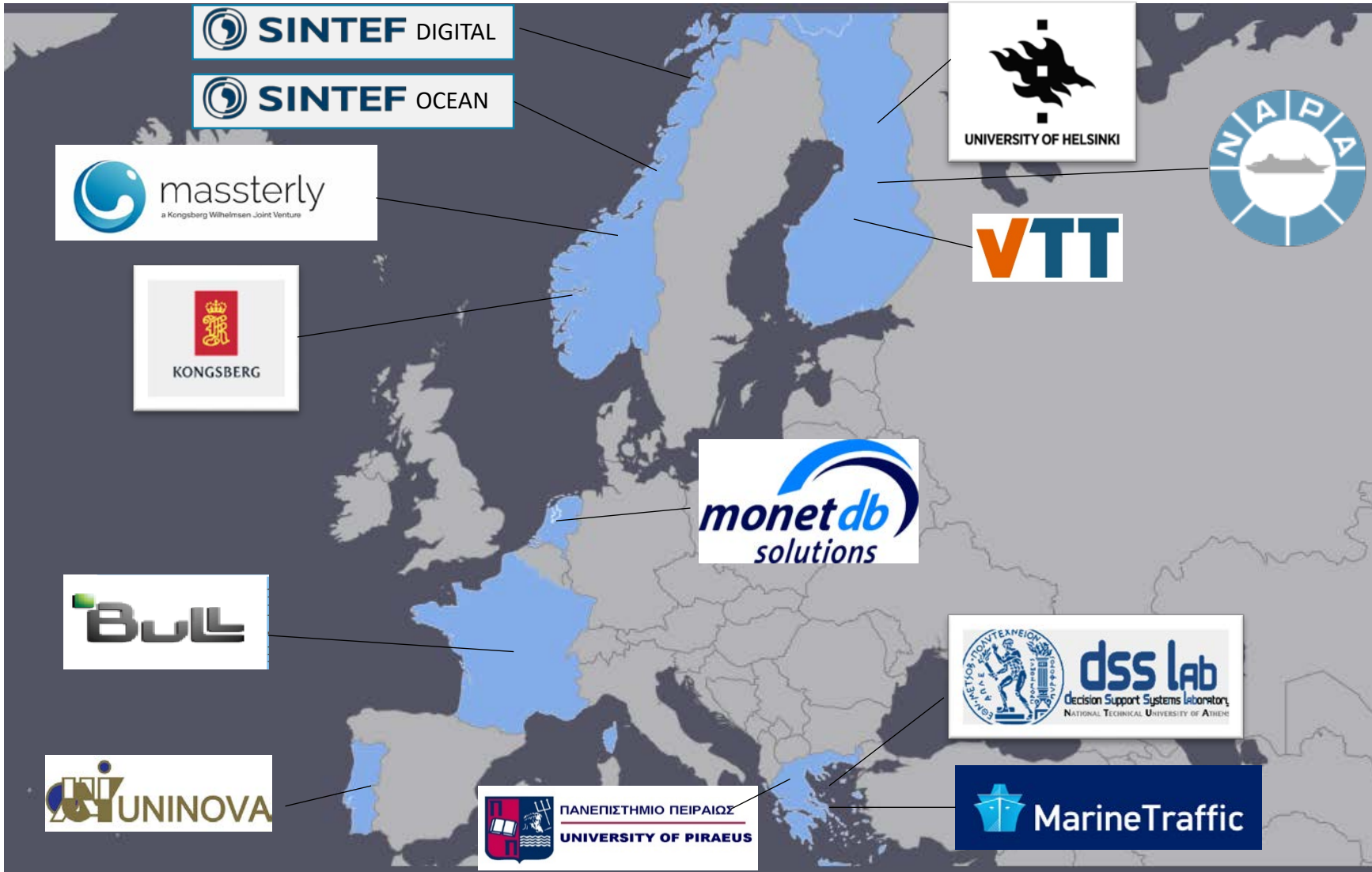
This project has received funding from the European Union's
Horizon 2020 research and innovation programme under grant
agreement No 957237



VesselAI Factsheet

VesselAI	Enabling Maritime Digitalisation by extreme-scale analytics, AI and Digital Twins
Project Number	957237
Starting Date	01/01/2021
Project Duration	36 months
Call (part) Identifier	H2020-EU.2.1.1. Leadership in enabling and industrial technologies - ICT
Topic	ICT-51-2020 - Big Data technologies and extreme-scale analytics - Research and Innovation action
Budget	€ 5.998.877,50 (Funding: 100%)

VesselAI Consortium



6 pilot partners pioneers in the maritime technology and intelligence

7 technical partners with expertise in:

- **Data engineering and analytics**
- **HPC technologies and AI acceleration hardware**
- **Artificial Intelligence**



Artificial Intelligence, HPC and Big Data in the forefront of Maritime digital transformation.

23000 casualties or incidents with a ship were recorded in European territorial seas 2011-2018 (EMSA)
65.8% attributed to a human error

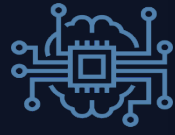
Shipping emits around 940 million tonnes of CO2 annually and is responsible for about 2.5% of global greenhouse gas (GHG) emissions (IMO GHG study)

Shipping emissions are projected to increase between 50% and 250% by 2050



Distributed and extreme-scale data processing

e.g. Hadoop, in-memory DBs, Streaming SQL, parallel processing



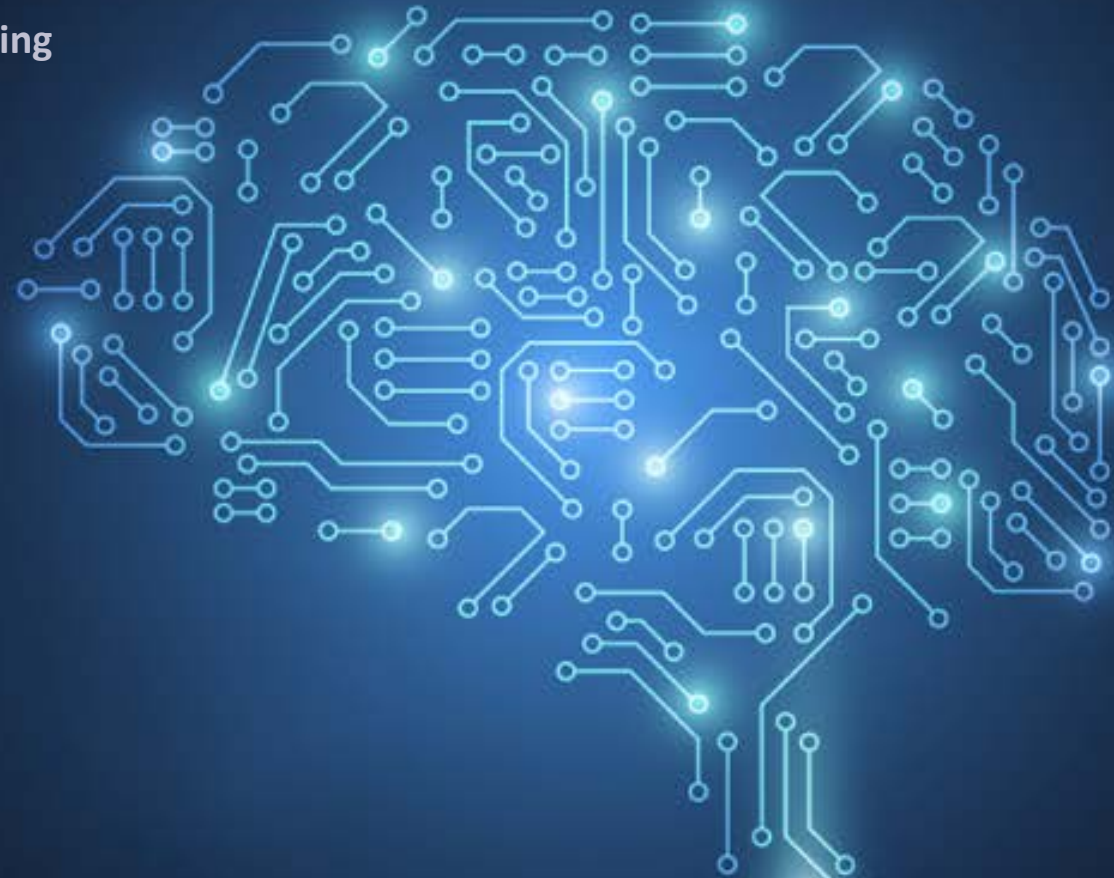
Machine and Deep Learning Reinforcement Learning

e.g. ANN, CNN, RNN, secure, federated learning, AutoML



HPC and AI Computing

e.g. HPC-AI convergence, TPUs, Neuromorphic Processors



Uptapped opportunities for a **diverse range of current maritime applications**

- Vessel traffic monitoring and management
- Ship energy system design and operation
- Autonomous shipping
- Fleet intelligence
- Route optimization
- Fuel consumption
- Predictive Maintenance



Digital Twin

- A digital representation of a physical entity
 - The physical entity generates real-time data / sensors and feeds the digital model
- Optimize time and money through monitoring, simulations and analysis of assets, processes, and workflows on the digital model



Limited available Effort
High Cost
Limited Expertise

Big Data & Extreme Scale Analytics
AI / ML model creation, training, deployment
HPC capabilities

Technical Challenges

- **Integrating physics-based and data-driven simulations**, using state-of-the-art analytics, machine learning models (ML) and HPC technologies **for the next-generation Digital Twins**
- **Efficient ingestion, cleansing, and enrichment of extreme-scale** data sets (especially streaming) coming from different sources still remains as a complex and resource-intensive process
- Complexity and accuracy of **creating, training, validating** and **deploying** AI models in heterogeneous and large-scale requirements
- Unexploited opportunities have arisen for **enhancing HPC architectures with AI-acceleration** that would be key for Maritime Industry use cases

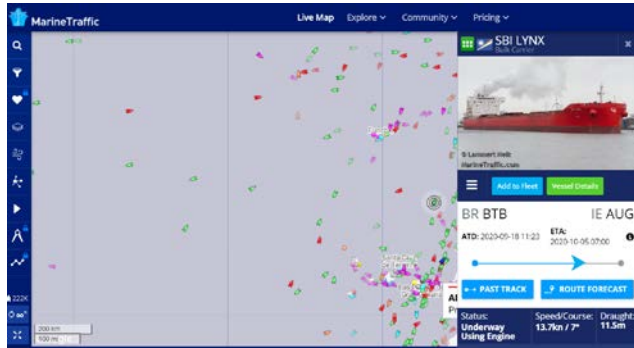
VesselAI Vision

VesselAI aims to develop, validate and demonstrate a novel holistic framework based on a combination of the state-of-the-art **HPC, Big Data** and **AI technologies**,

capable of **performing extreme-scale and distributed analytics** for **fuelling the next-generation digital twins** and maritime applications and beyond including:

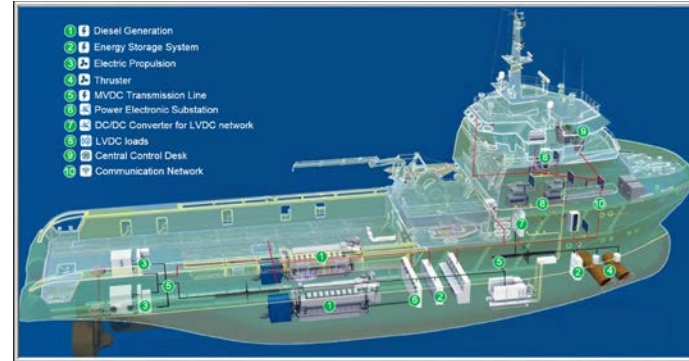
- vessel motion and behaviour modelling,
- analysis and prediction, ship energy system design and optimisation,
- unmanned vessels,
- route optimisation
- fleet intelligence

VesselAI Pilot Cases



1

Ship Modelling for global vessel traffic monitoring and management



2

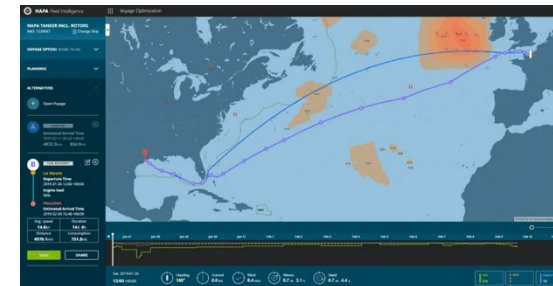
Globally Optimal Design of Ship Energy Systems



3

Autonomous ships in short sea transport

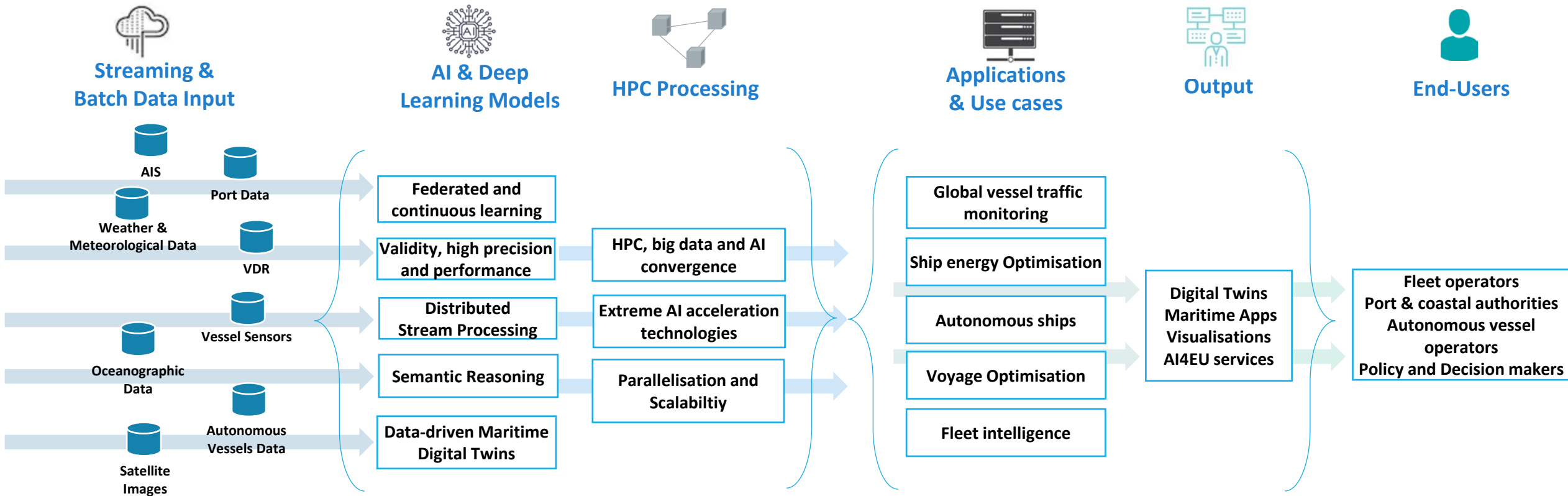
4



Weather Routing and Fleet Intelligence Service in Shipping



VesselAI Contribution / Assets



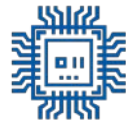
Plan

Business needs from the Industry /
Pilots - Requirements

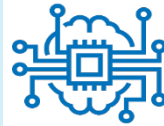
← We are here
End of June 2021



Data Services



HPC Services



AI Services and
Models

First Version
End of December 2021

Integration and Testing

First Integrated Services
End of March 2022

Pilot Apps Realisation / Extension of existing Maritime Apps, Digital Twins,
Tools to use Vessel AI models and Services. Evaluation

First Evaluation
End of July 2022

First Iteration



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<https://vessel-ai.eu/>
[https://twitter.com/vessel ai](https://twitter.com/vessel_ai)

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