



The Digital Twin of the Ocean



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Digital Twins of The Ocean: Autogenerated 3d Environments for Validating Offshore Wind Farm Operations

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Location:	Rome, Italy
Date:	20 October 2023



Goals



Enhanced Real-World Representation beyond 2D interfaces, and capture intricacies of environments.

Putting in perspective the sense of scale in the real world in a tangible and intuitive way.

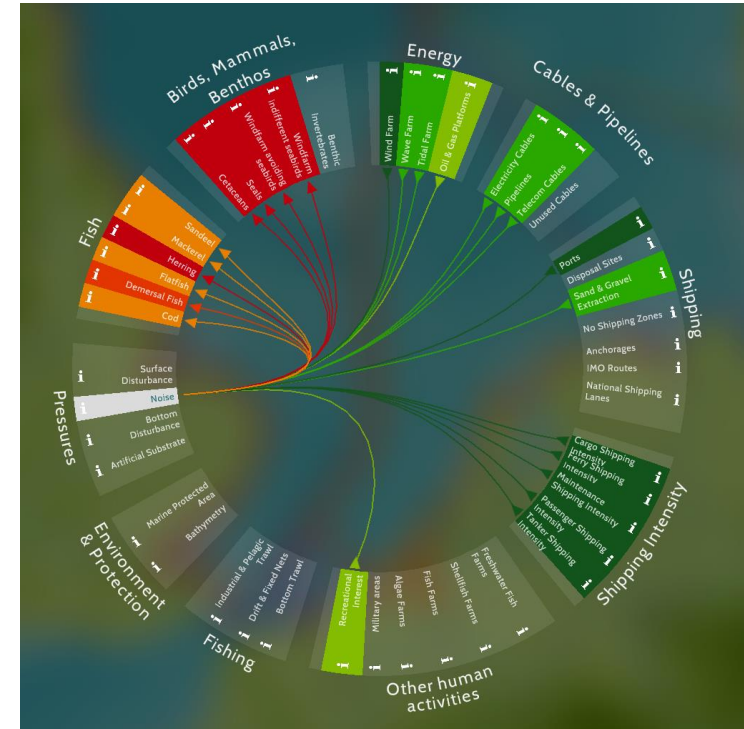
Using Data-Driven models to generate hyper-realistic visualizations.

Leveraging Game Technology for supporting integration of the System of Systems



Usecases

- 3D Visualization of environmental impacts
- Education
- Instruction
- Exploration
- Knowledge



Design

Identification of different content core elements.

Core elements are content that are thematically closely linked together and that may generated required different algorithmic treatment.



Environmental conditions

realistically depiction of the situation in a location: bathymetry, sediment layer, wave and weather conditions.



Biological conditions

realistic depiction of the situation of the fauna and flora, based on biology charts and biomass information.



Human Activity: Wind farms

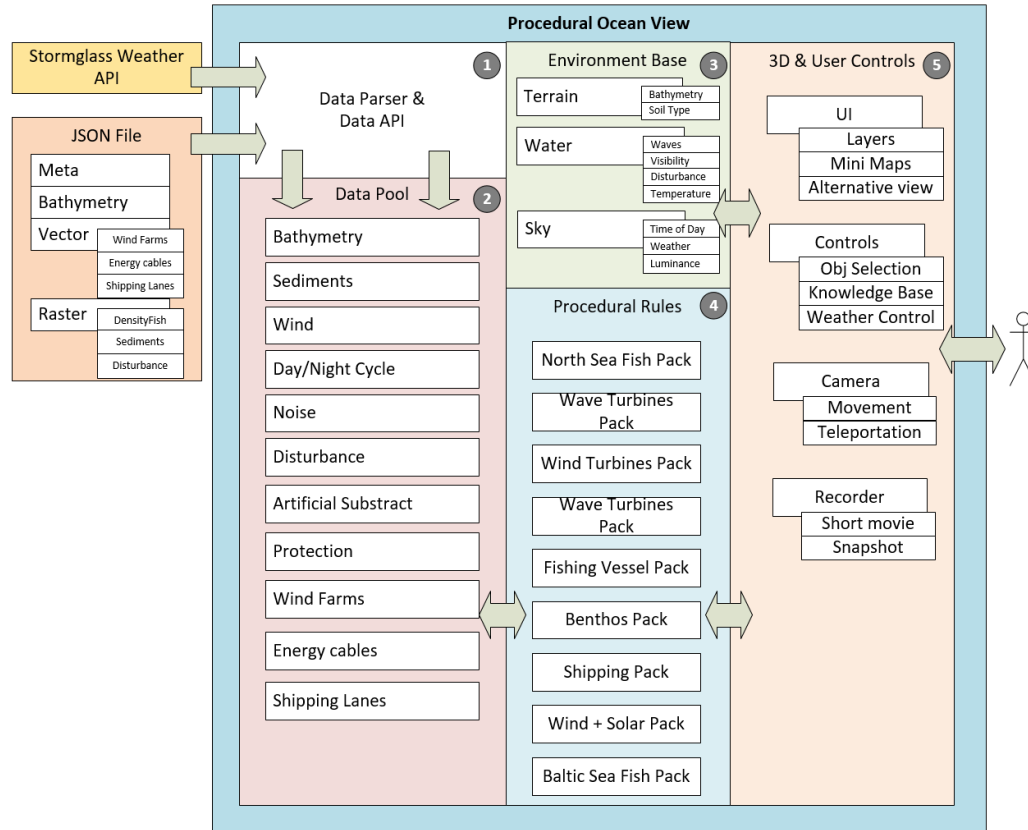
Provide information about wind turbines, cabling, energy production and ecological pressures like noise.



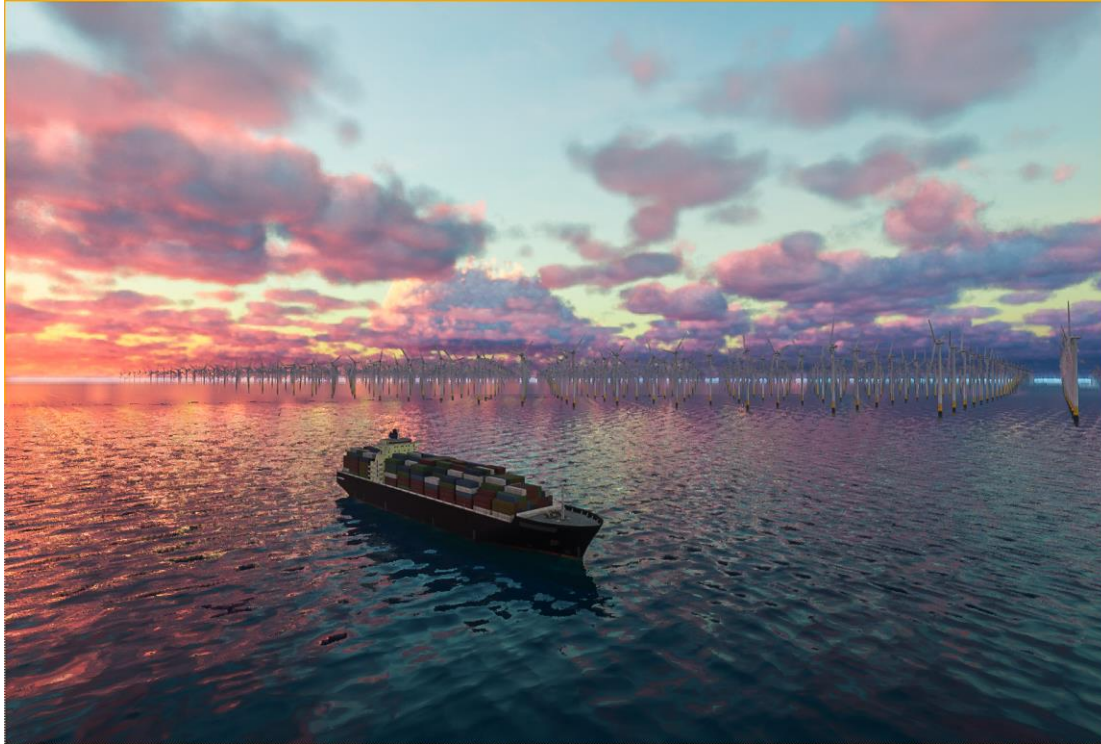
Human Activity: Shipping

Provide information about shipping corridors, and traffic representation, and shipping vessels.

Procedural system



Development



Unreal Engine 5.2

PC and VR versions with IGD-R
Fraunhofer

Technical Demo (Far from complete)



Fully data driven

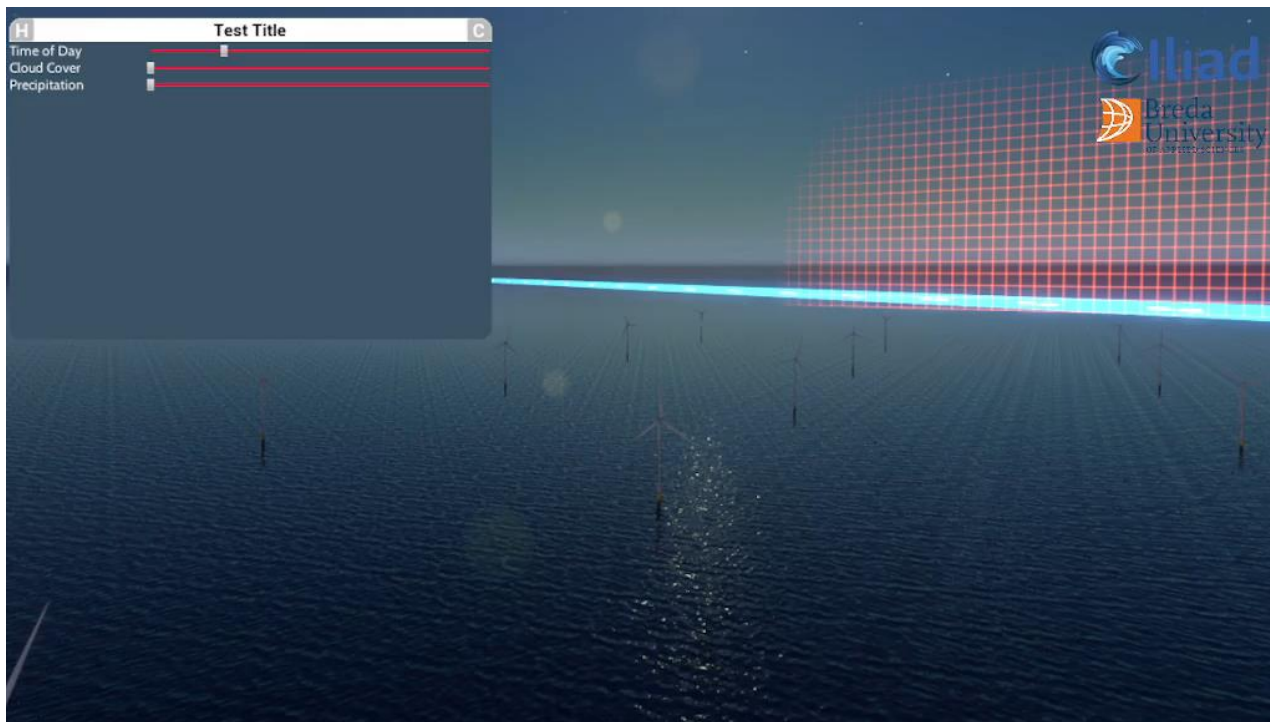
Wind turbines and wave power energy generation.

Underwater environment

Environment Delimitation

Visualization of shipping lanes

Technical Demo (some controls)



Controls over environmental conditions.

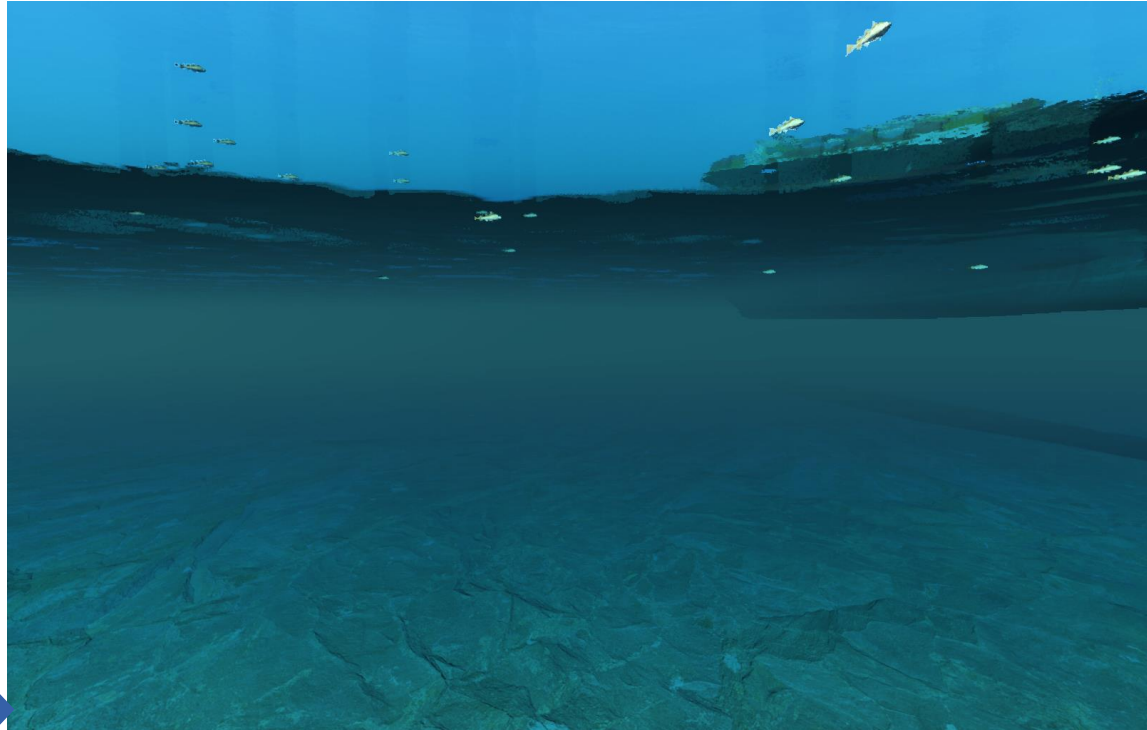
Time and day night cycles

Cloud Coverage

Next Steps

To be discussed & considered integration with other Human Activities.

- 1 Connection & collaboration with partners
- 2 Design VR Controls
- 3 Visualization modes (shipping lanes, energy production)



Underwater visualization: Sediment layer 

Thank you

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