Digital TwinS of the Ocean

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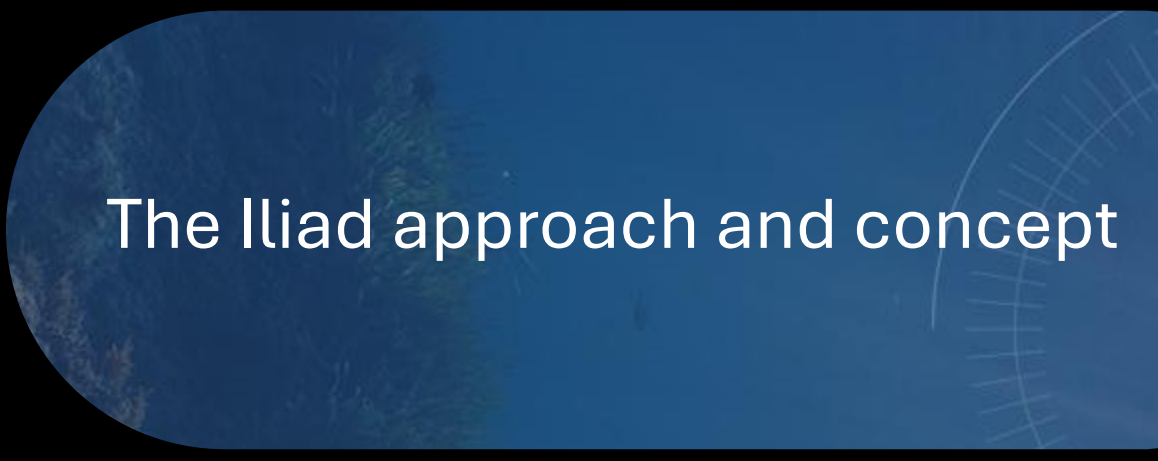
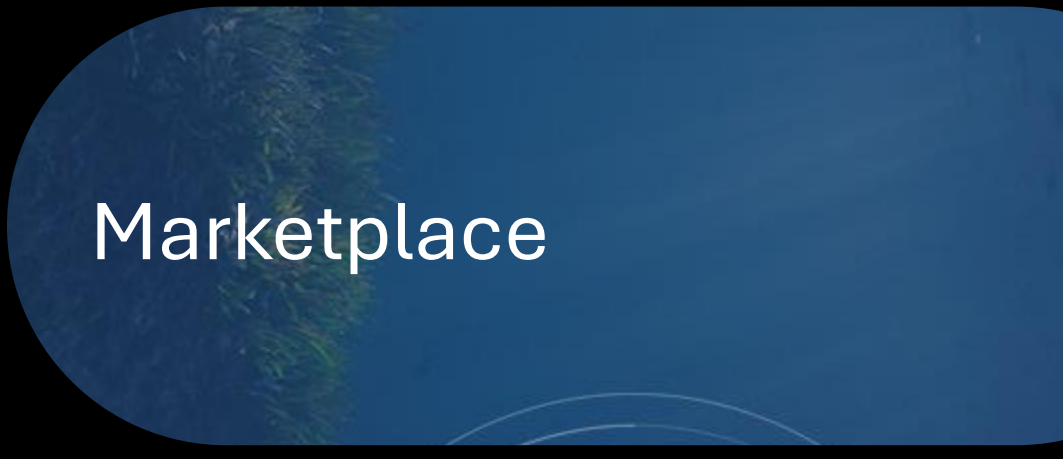
Iliad and digital twins
of the ocean


The Iliad approach and concept


Impact


Marketplace

BLB

What now?

What next?

What if?

What happened in the past? What else?

Digital Twin: digital representation of a target entity with data connections that enable convergence between the physical and digital states at an appropriate rate of synchronization

ISO SC41 IoT and Digital Twin – ISO 30173 DIS

(Environmental) **Digital Twins of the Ocean** are a virtual representation of the real ocean and have a two-way connection with it. Observations from the real ocean change and refine the twin; manipulating the twin can highlight regions of the real ocean in need of better or different observations.

UN DITTO

THE ILIAD APPROACH & CONCEPTS

The ocean is **vast and complex**. It consists of geophysical, biological and **numerous interaction** between its components and **human activity**.

To reflect this complexity of **European digital twin of the ocean**, the EU, its members and associates are developing a core infrastructure, Modelling capacity and implementations in local and sector /thematic twins.

This ecosystem of twins and its components are referred to as the European digital ocean twin.

Iliad partnership being part of this dynamic ecosystem is working closely with other projects and initiatives (public & private) to ensure **alignment** by using similar standards, APIs, best practices etc.

Iliad partnership is working towards the implementation of **interoperable** systems, services and assets.

ILIAD IN A SEASHELL

Enabling an ecosystem of interoperable digital twins for the ocean trough:

- Connecting to *existing* ocean data infrastructures
- Enhance ocean data infrastructures with *additional* observation technologies and citizen science

Create an open marketplace accessible for all providers and users by:

- Development of *innovative methods* in open frameworks and platforms
- Enable model *evaluations & comparisons* for many Earth science applications from weather, energy, aquaculture to climate and more

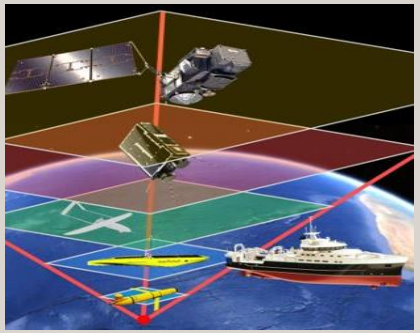
Provide solutions to address future societal challenges by:

- Assembling a broad and diverse *user community* of existing and new users,
- Supporting the communities in testing and using the project's *innovative technological solutions*

A federated interoperable system

Digital Twin Data Acquisition/Collection → Digital Twin Representation → Digital Twin Hybrid (Cognitive) Analytics Models → Digital Twin Visualisation and Control

Observations & Data Spaces



Stream Handler

SIMPL, IDSA, ODIS

Copernicus "Data Space"

EMODnet, SeaDataNet

EOSC "Data Space"

Green Deal Data space (AD4GD/GREAT)

Citizen Science, Biodiversity, Socio-Ecological Data

APIs

Digital Twin 2

APIs

Digital Twin 1

Semantic Interoperability Harmonisation

Workflow Engine (CWL)

Visualization and control

DT Services

Iliad Services

EDITO Services

APIs

APIs

Models & Tools

AI/ML Services

DT Data Lake

Iliad Data Lakes

EDITO Data Lake

APIs

DT Engine

Iliad Engines

EDITO Engine

DTO Demonstrators – Aquaculture, Oil Spill, Fishery, Sediments, Jelly Fish, Energy, Water quality,Biodiversity, …

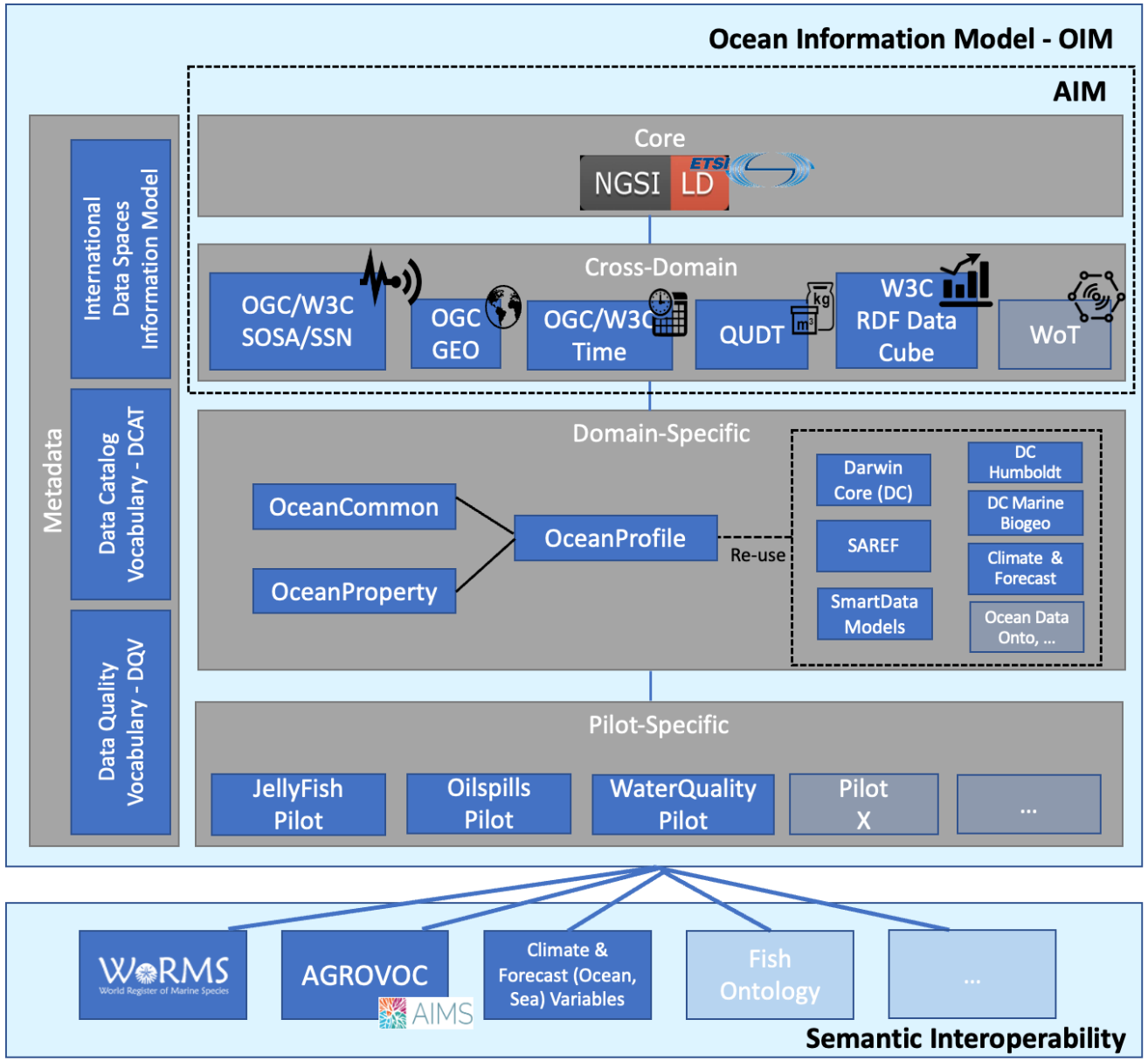
Sensors-Edge-Fog-Cloud-HPC Continuum

DTO Best Practices/ Methods & Standards

Iliad Marketplace Twins, data, models, resources

J. Pearlman, A-J Berre, J. Maso, B. L. Bye

Ocean Information Model



Harmonisation

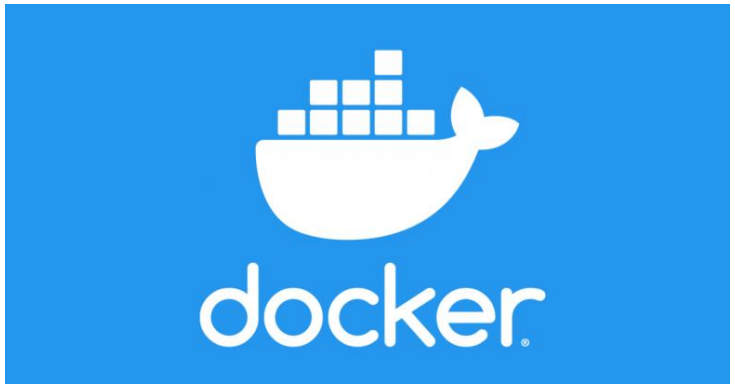
Overview of the layers of the first release of the ILIAD Ocean Information Model (OIM)

Standards
Best practises

Application Package

An Application Package refers to a comprehensive collection of software, resources, and specifications bundled together, designed to distribute and execute specific data processing workflows.

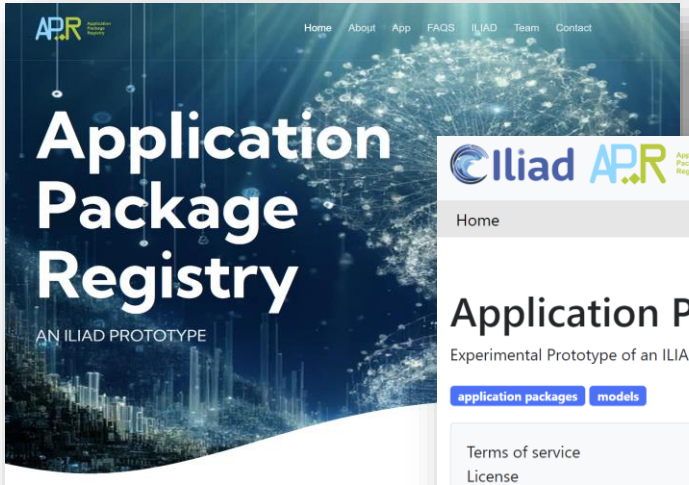
Guarantees the automation, scalability, reusability, portability of the Application while also being workflow-engine and vendor neutral.

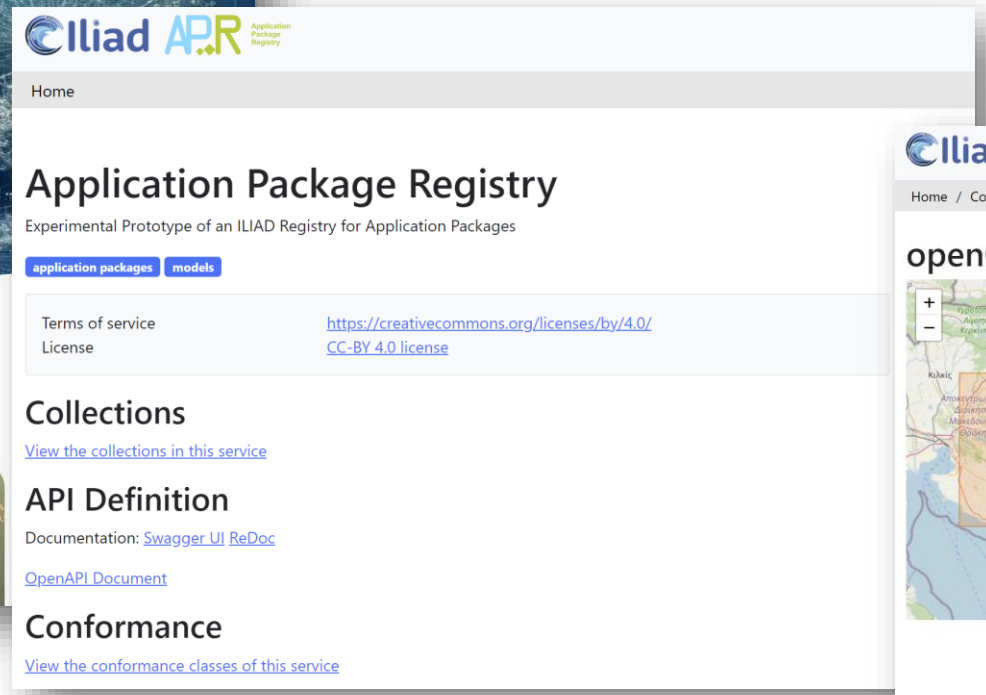


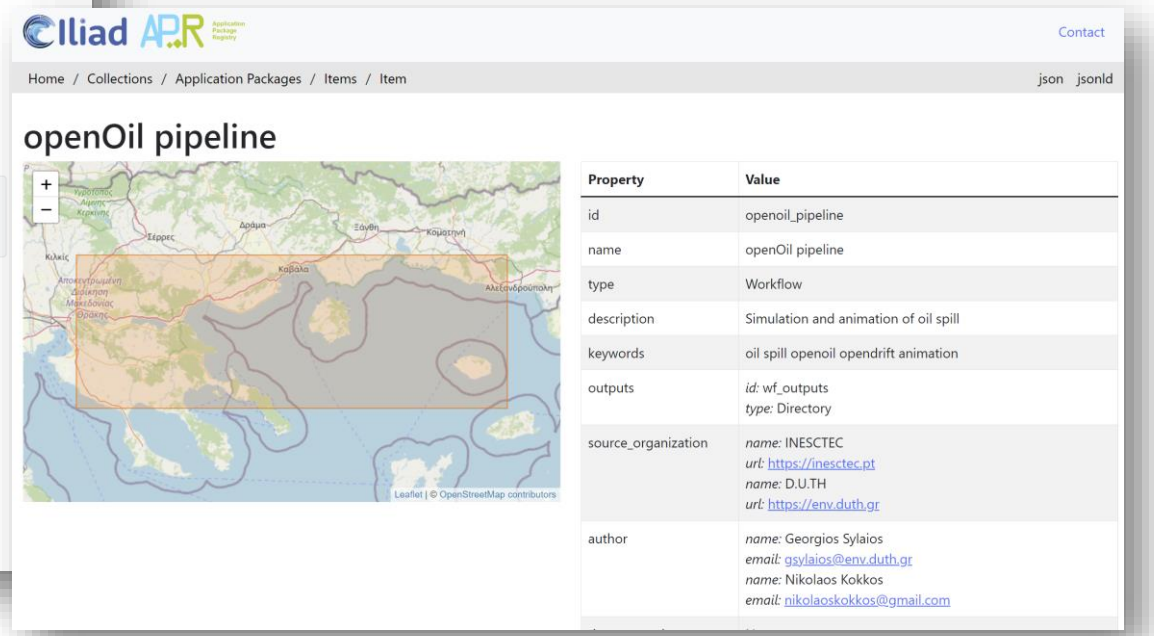
Reuse
Reproduce

Application Packaging - Registry demonstrator

- Make your Application Packages findable.







- PygeoAPI based demonstrator
- OGC API Features
- Register and search

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https://iliad-registry.inesctec.pt/collections/aps/items?f=json&description=oil

ILIAD DIGITAL TWINS OF THE OCEAN

Existing Wind Farm Capacity

Ocean Energy Potential

Coastal Sediment Transport

Plastic Pollution Monitoring

Oils Spill Simulation

Insurance For Marine & Maritime Activities

Jellyfish Swarm Forecast

Harbour Safety

Met Ocean Hind, Now & Forecast

Fisheries Productivity & Sustainable Aquaculture

Ballast Water Monitoing

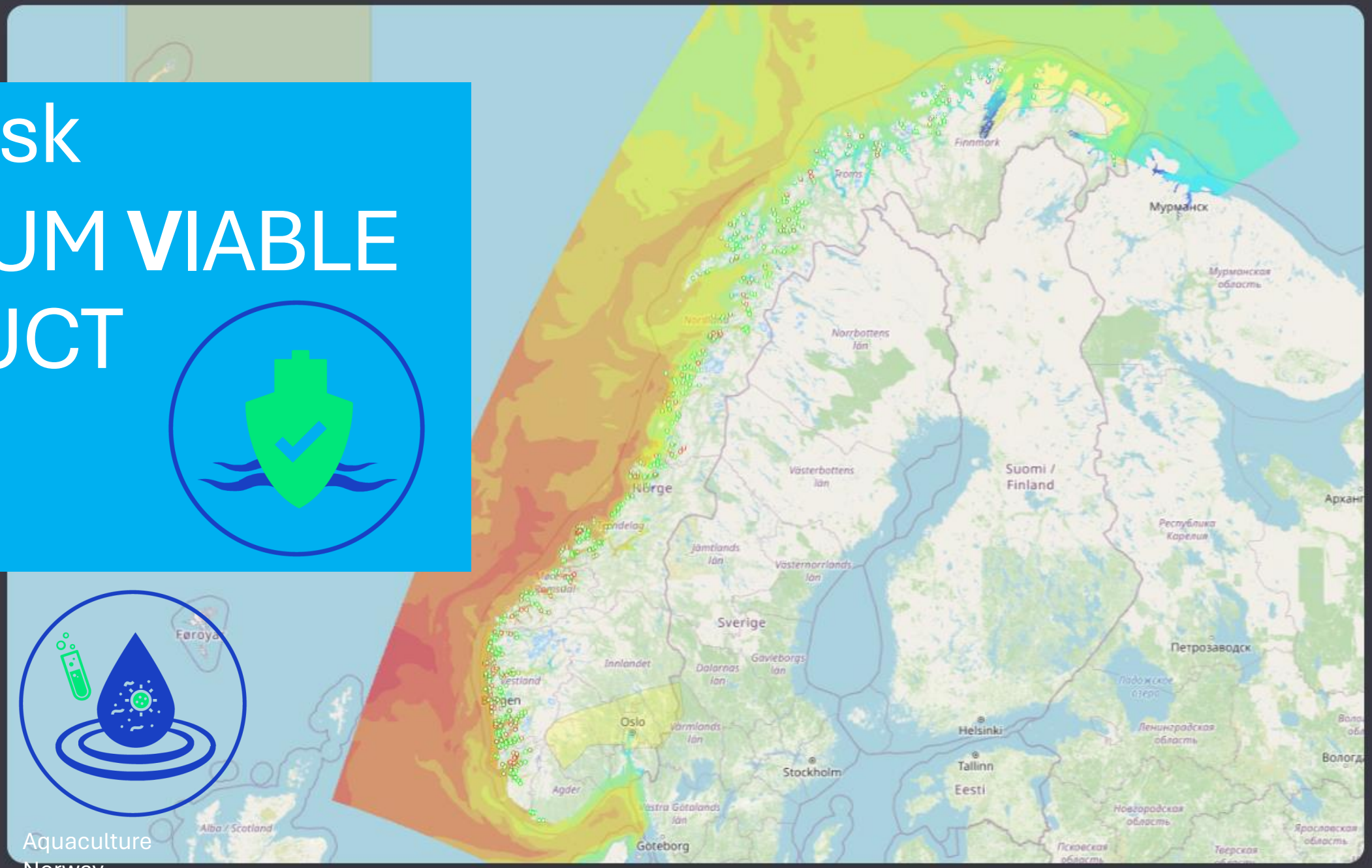
Aquaculture & Harmful Algae, Water Quality & Ship Traffic

Filters

Year 2023

AquaRisk

MINIMUM VIABLE PRODUCT



Water quality

Aquaculture Norway

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INNOVATION BOOSTER

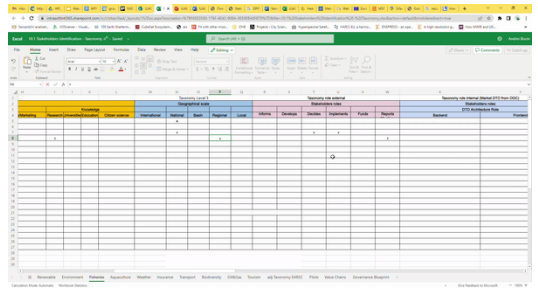
The ILIAD Academy

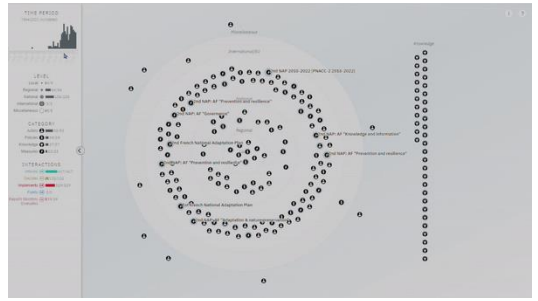
The ILIAD Blue Technology and Business Innovation Facility

The ILIAD Policy Impact Facility

The ILIAD Digital Blue Growth Hub

The ILIAD Marketplace





THANK YOU!

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