

Iliad and Blue Cloud 2026 Joint Workshop @ OCEAN 2025

Title: “Challenge for a digital Maritime Spatial Planning (MSP): development of decision-support tools for a DTO (Digital Twin of Ocean) integration perspective”

Abstract

Maritime Spatial Planning (MSP) has become a cornerstone of sustainable ocean governance, facilitating the balanced allocation of marine space to diverse human activities. The increasing complexity of these activities, coupled with the need for robust environmental management, has driven a significant "digital turn" within MSP [1]. This transformation is characterized by the growing reliance on geoinformation and geotechnologies, encompassing Geographic Information Systems (GIS), geoportals, and, critically, Decision Support Tools (DSTs). While the foundational role of GIS and geoportals is well-established, the heterogeneity and developmental stage of DSTs, particularly spatial DSTs (sDSTs), present both opportunities and challenges [2]. sDSTs, leveraging algorithmic processing of spatial data, hold immense potential for enhancing decision-making in MSP.

In response to this, Shom is actively developing Navisafe within the EU-funded ReMAP project¹. Navisafe is built upon the deSEAsion platform², which is a highly generic sDST, designed to address a wide array of maritime decision and assessment tasks. This inherent genericity provides a robust and adaptable foundation, enabling the development of tailored applications like Navisafe. Navisafe, therefore, is designed to deliver sophisticated maritime safety risk analyses, generating risk heat maps that inform MSP planning and facilitate the assessment of maritime activity impacts [2]. This initiative directly addresses the imperative for transparent, explainable and interoperable tools that transcend national boundaries, fostering coordinated MSP across pan-European sea basins.

Furthermore, the emergence of Digital Twin of the Ocean (DTO) initiatives, notably EDITO, necessitates exploring sDST integration. Navisafe and deSEAsion are designed to address this integration by prioritizing the incorporation of human expertise within the analytical loop and ensuring the traceability of evaluation processes. This focus on explainability, enabling users to understand the rationale behind algorithmic recommendations, is crucial for fostering trust and effective decision-making within DTO-enhanced MSP.

Key words:

digital MSP, DTO, sDST, informational challenge, data interoperability/harmonization, traceability/explainability

¹ <https://maritime-spatial-planning.ec.europa.eu/projects/reviewing-and-evaluating-monitoring-and-assessment-maritime-spatial-planning>

² <https://recherche.imt-atlantique.fr/deseasion/>

Authors:

Yannick Leroy (a), Patrick Meyer (b), Bastien Fouque (a), Émilie Delaroche (a), Nicolas Duminy (b), Adeline Souf (a)

(a) French Hydrographic and Oceanographic Service (Shom)

(b) IMT Atlantique

Bibliography:

[1] Juliette Davret, Brice Trouillet & Hilde Toonen (16 Nov 2023): The digital turn of marine planning: a global analysis of ocean geoportals, *Journal of Environmental Policy & Planning*, DOI: 10.1080/1523908X.2023.2283081

[2] Kemal Pınarbaşı, Ibon Galparsoro, Ángel Borja, Vanessa Stelzenmüller, Charles N. Ehler, Antje Gimpel, Decision support tools in marine spatial planning: Present applications, gaps and future perspectives, *Marine Policy*, Volume 83, 2017, Pages 83-91, ISSN 0308-597X, <https://doi.org/10.1016/j.marpol.2017.05.031>.

[3] Emilie Delaroche, Bastien Fouque, Yannick Leroy, Adeline Souf, Andrey Abramic. 2023. Navigation safety analytical module, D2.10, Project: 101081304 — ReMAP — EMFAF-2021-PIA-MSP