mFUND
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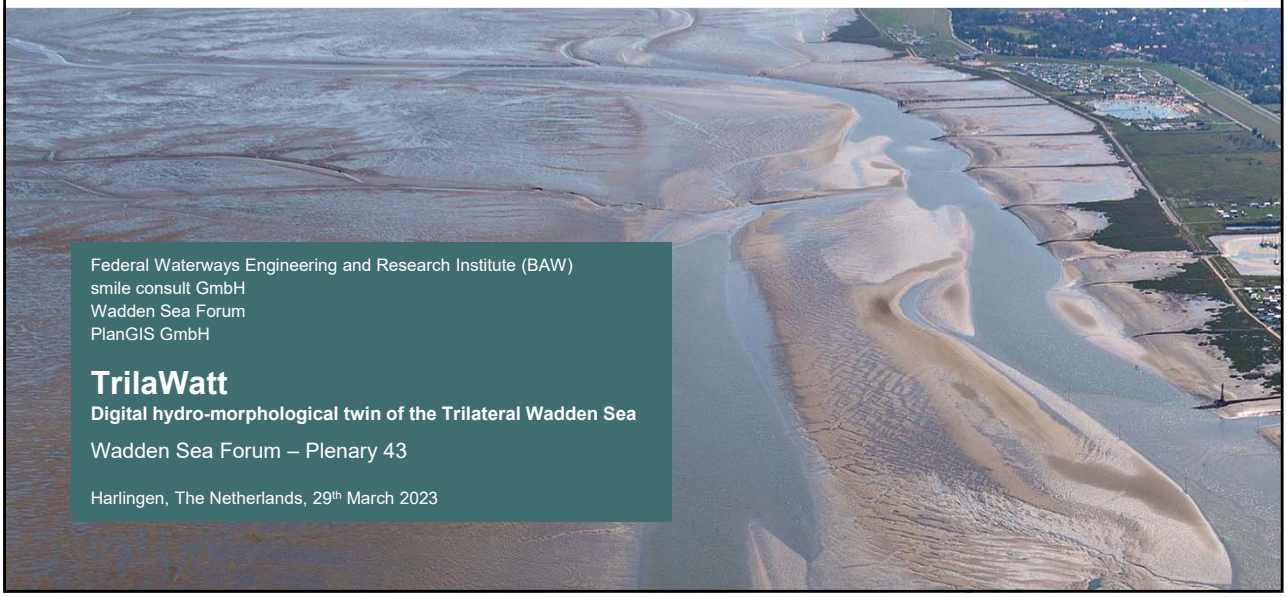
TrilaWatt



Federal Waterways Engineering and Research Institute (BAW)
smile consult GmbH
Wadden Sea Forum
PlanGIS GmbH

TrilaWatt

Digital hydro-morphological twin of the Trilateral Wadden Sea

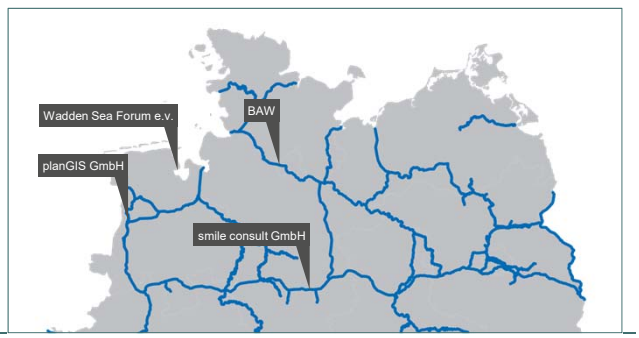
Wadden Sea Forum – Plenary 43

Harlingen, The Netherlands, 29th March 2023

The Research Team

- **Federal Waterways Engineering and Research Institute (BAW)**
  - Wedeler Landstraße 157, 22559 Hamburg, Germany
- **smile consult GmbH**
  - Schiffgraben 11, 30159 Hannover, Germany
- **planGIS GmbH**
  - Kastanienallee 4, 26789 Leer, Germany
- **Wadden Sea Forum e. V.**
  - Virchowstraße 1, 26386 Wilhelmshaven, Germany

BAW Bundesanstalt für Wasserbau
smile consult
PLANGIS
WADDEN SEA FORUM



Research Objective and Work Packages

Research objective:

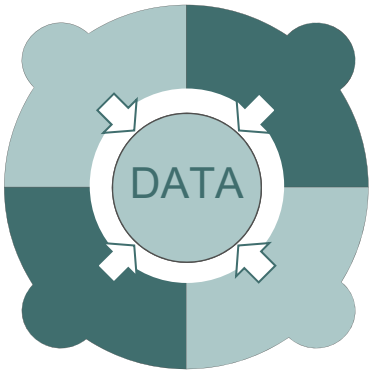
Our goal is the synthesis of scattered data (A-C) in the Trilateral Wadden Sea area to reliable, high-resolution data products for research, consulting, and governmental policy decision in the period of 2000 to 2020.

(A) Geomorphology

Consistent, annual high-resolution bathymetry data.

(B) Surface Sediments

Information about likely surface sediments using sediment samples and numerical modeling.



(C) Physical Oceanography

Numerical simulations of the entire North Sea to describe tides, salinity, heat flux, and sediment transport.

(D) Interactive Webviewer

Enabling users from different background to move efficiently through our big data collection.

Project Objectives

(1) Facilitate the planning and maintenance of Transport Infrastructure

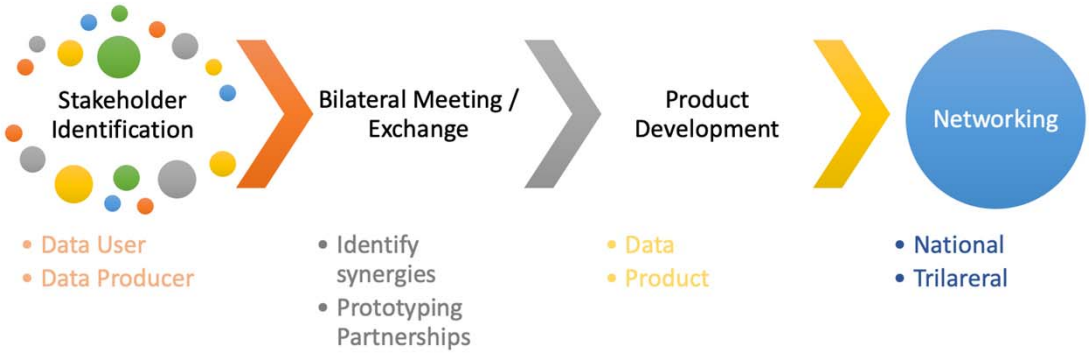
(2) Facilitate the research, reporting and monitoring on the quality status of the Wadden Sea

(3) Support various sectors in the planning phases of their projects that might have an impact on the Wadden sea. i.e.

- Offshore Energy exploration
- Nature Conservation
- Fishing & Aquaculture
- Tourism
- Maritime activities

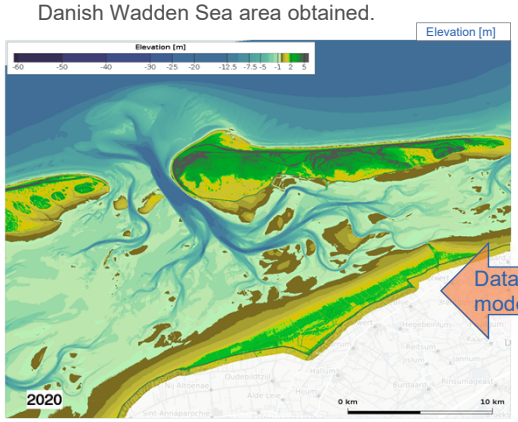
Stakeholder engagement

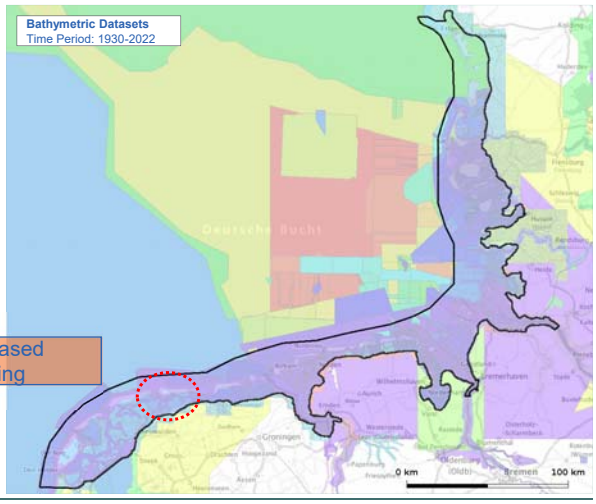
Stakeholder Engagement Process



Status on Data: Coverage of the bathymetric data collected up to date

- ~144.000 bathymetric surveys and Open-Source products intended as final product (~370 Billion points with elevation data)
- Up to date insufficient data covering the
- Danish Wadden Sea area obtained.

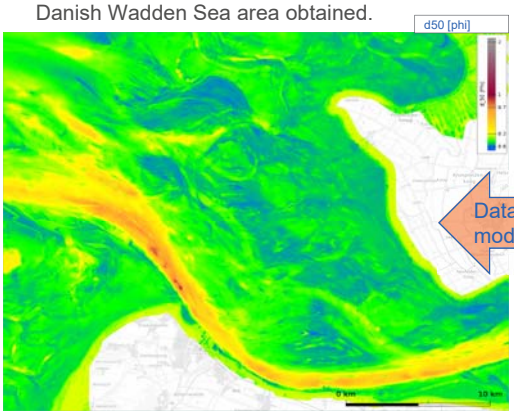




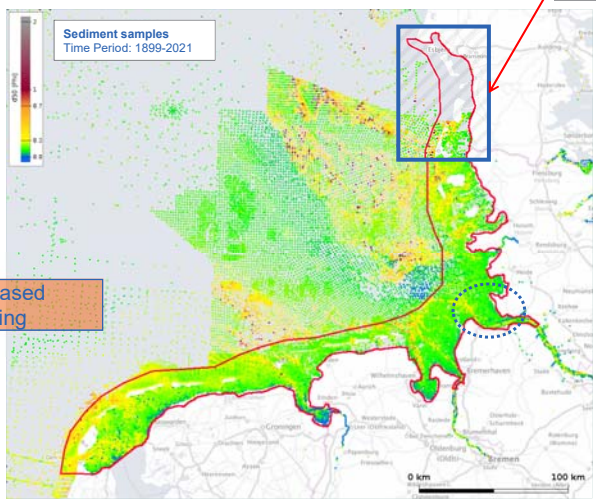
Source: Smile Consult

Status on Data: Coverage of the sedimentological data collected up to date

- ~45.000 surface sediment samples collected for the project area.
- Up to date insufficient data covering the
- Danish Wadden Sea area obtained.



Data-based modelling



Source: Smile Consult

Status on: Potential Pilot Cases

Bilateral Meetings

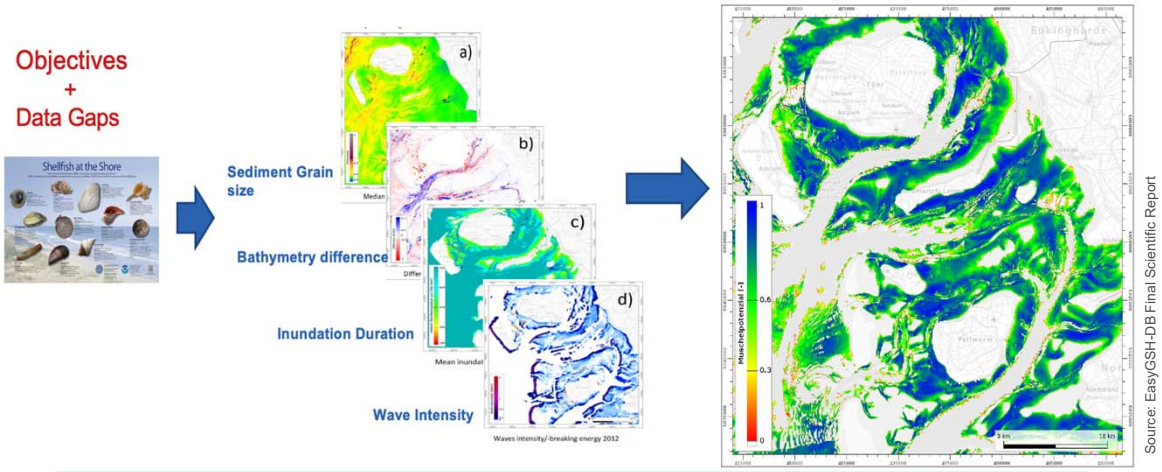
- Hereon Institute (CoastalFutures Project)
  - Potential Pilot case ⟶ Habitat Type Identification

Close cooperation between the TrilaWatt and LTER-LIFE project.

- Bringing together Physical Twin and Biological Twin of the Wadden Sea

TrilaWatt Application : Habitat Identification

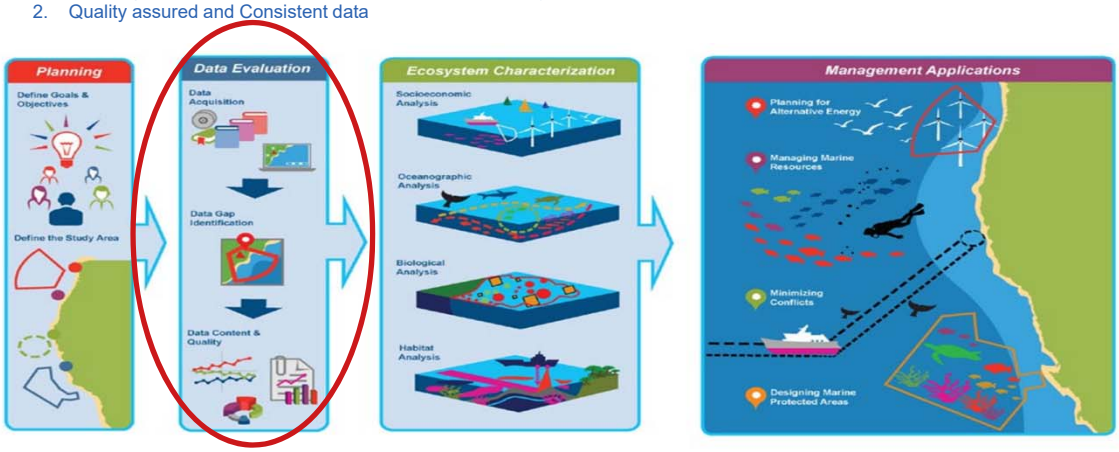
Planning | Data Evaluation | Habitat Identification



TrilaWatt Application : A Tool To support Marine Spatial Planning

The assistance systems that facilitates:

1. Planning procedures for the development of Offshore Projects
2. Quality assured and Consistent data



Source : O'Hagan, Anne Marie. 2020 State of the Science Report, Chapter 11: Marine Spatial Planning and Marine Renewable Energy. United States: N. p., 2020. Web. doi:10.2172/1633204.

Mussel Habitat Identification: Environmental factors

Table 10: Determined limit values (bold) for influential environmental factors.

	Eulittoral mussel deposits			Subtidal mussel deposits		
Environmental parameters	*Minimum*	*Maximum*	*Median*	*Minimum*	*Maximum*	*Median*
Erosion-/sedimentation rate [m / year]	**-0,2**	**0,7**	–	**-0,2**	**0,6**	–
Sediment distribution d50 [mm]	**0,079**	0,652	0,175	**0,104**	0,377	0,166
relation dry fall duration/tide [%]	0	**42,210**	14,163	0	0	0
Mean ebb current [m/s]	**0,025**	**0,311**	0,155	**0,115**	**0,389**	0,287
Mean flood current [m/s]	**0,023**	**0,317**	0,153	**0,084**	**0,404**	0,238
Orbital velocity [m/s]	**0,074**	**0,504**	0,290	**0,097**	**0,417**	0,256
Bed shear stress ebb [N/m²]	**0,026**	**0,979**	0,259	**0,123**	**0,744**	0,312
Bed shear stress flood [N/m²]	**0,026**	**1,309**	0,213	**0,163**	**0,794**	0,355
Wave intensity/- breaking [W/m²]	0	**0,21**	0,001	0	0	0
Salinity [°/‥]	**18,676**	27,717	24,379	**22,863**	24,754	23,598

Smile Consult

Use- Case : Cable - Route Planning

BAW

PlanGIS

Take-Home-Messages

(1) The availability of **consistent data** is imperative to sustainable, efficient decision making

(2) We create **FAIR bathymetry**, **surface sediment**, and **hydrodynamic data** for the Wadden Sea

(3) Navigation, data-processing and data science will be enabled **on-the-fly** in a **web environment**

END

Thank You

Product Development: Example Use-Cases

Sector Based Application of the TrilaWatt Data products

Nature Conservation
- Habitat Identification
- Habitat Analysis
- Mussel Potential

Energy
- Morphological stability
- Cable route planning
- LNG Terminal

Maritime Transport
- Navigation Channels
- Cost Optimization
- Maintenance of Fairways

Coastal Protection
- Sediment budgets
- Data-driven decision Making

Marine Spatial Planning
- Participation
- Data Evaluation
- Product development

TrilaWatt Application : A Tool To support Marine Spatial Planning

Objectives
+
Data Gaps