



CrowdSea Mapping

MobiSpaces use-case #5

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Funded by
the European Union

UC#5 Motivation

Danish Geodata Agency – Hydrographic office

☞ Nautical charts

- ☞ Maps of a sea area for navigation

☞ Depth models

- ☞ Depth data for other purposes

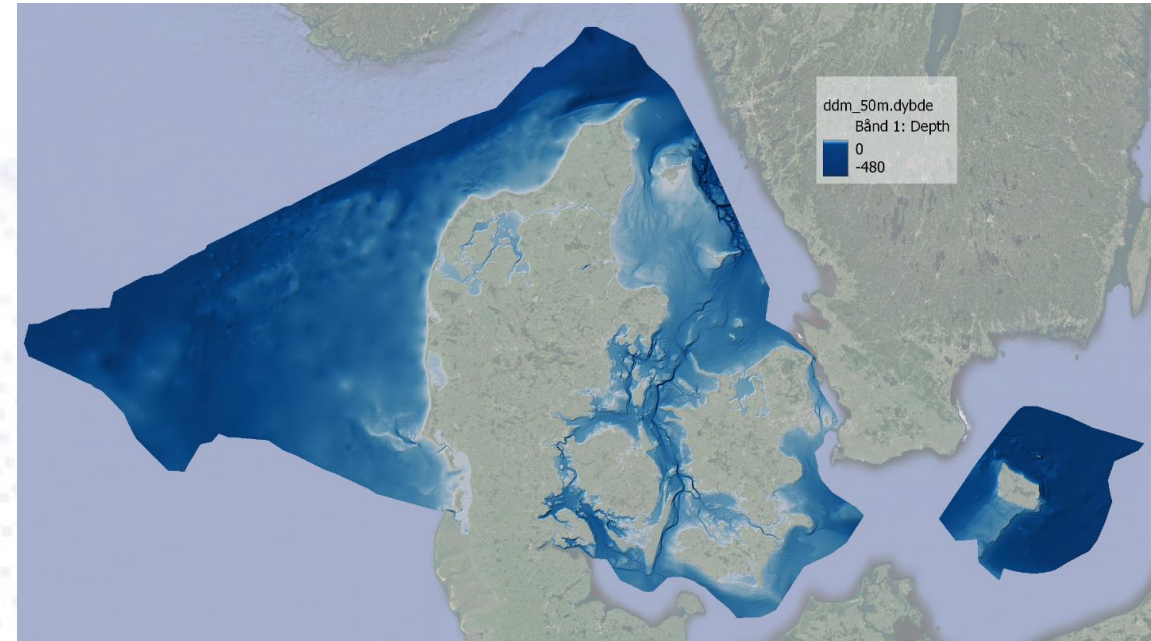
☞ Covers Denmark and Greenland

☞ Primary source of new data

- ☞ Danish Navy

- ☞ Other Agencies

- ☞ Commercial companies



Denmark's Depth Model, 50 m resolution - Depths

<https://eng.gst.dk/danish-hydrographic-office/denmark-depth-model>

UC#5 Motivation Data Challenges

☞ 18% dense multi-beam sonar (green)

☞ Dense data

☞ Short survey seasons

☞ Limited resources

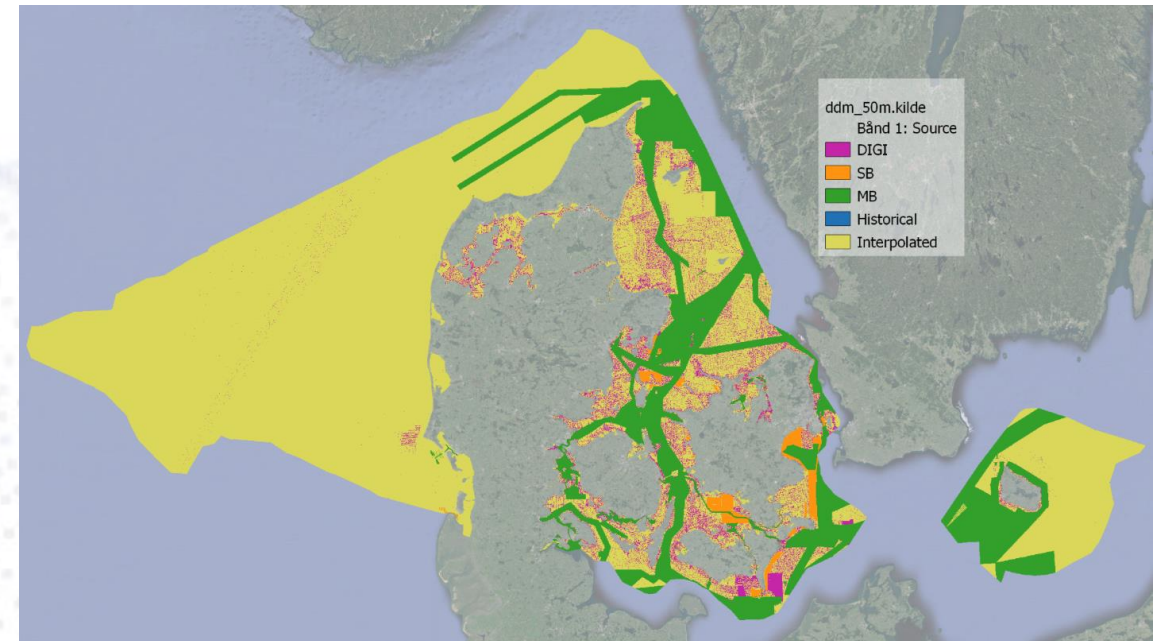
☞ 6% historic data (orange, purple, blue)

☞ Sparse data

☞ Data is getting outdated

☞ 76% interpolated (yellow)

☞ Large areas not surveyed



Denmark's Depth Model, 50 m resolution – Data source
<https://eng.gst.dk/danish-hydrographic-office/denmark-depth-model>

UC#5 Motivation

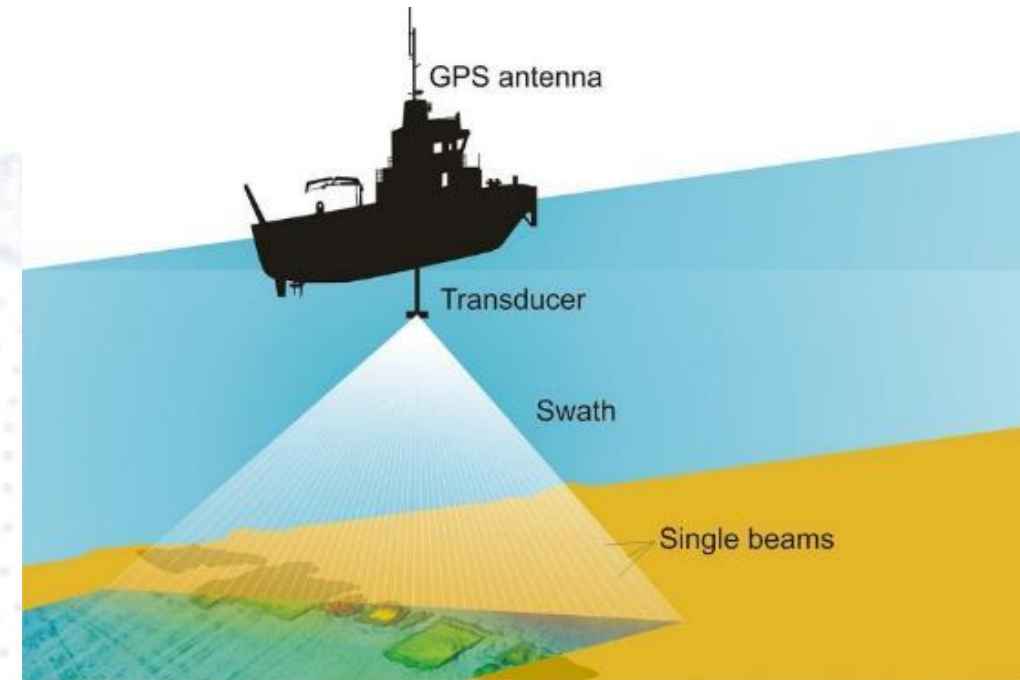
Crowdsourced Bathymetry (CSB)

Collecting data from the crowd

- Low-cost and reliable bathymetry data loggers
- Wide coverage

CSB Challenges

- Slow and expensive communication
- Often offline
- Unmonitored equipment and devices
- Difficult quality assessment



UC#5 Motivation

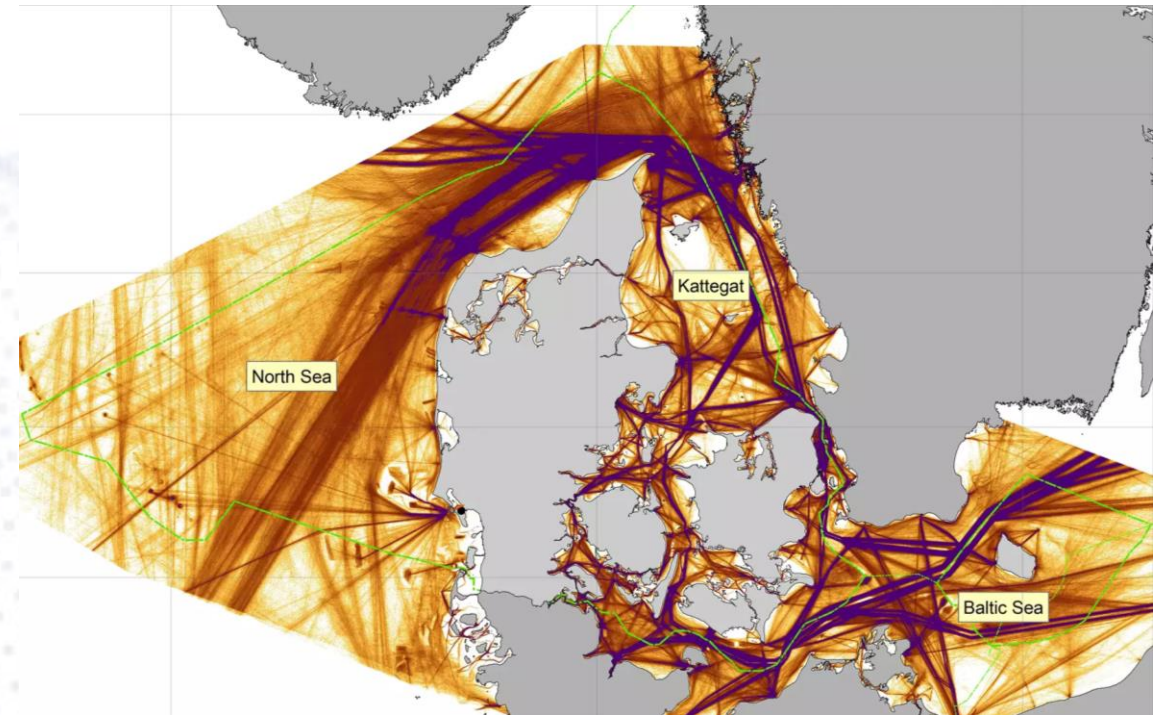
Crowdsourced Data Potentials

Class A AIS

-  SOLAS compliant shipping
-  Covers main passages

Class B AIS

-  Recreational and smaller commercial vessels
-  Covers majority of inland waters



Source: Danish Maritime Authority

UC#5 Objective

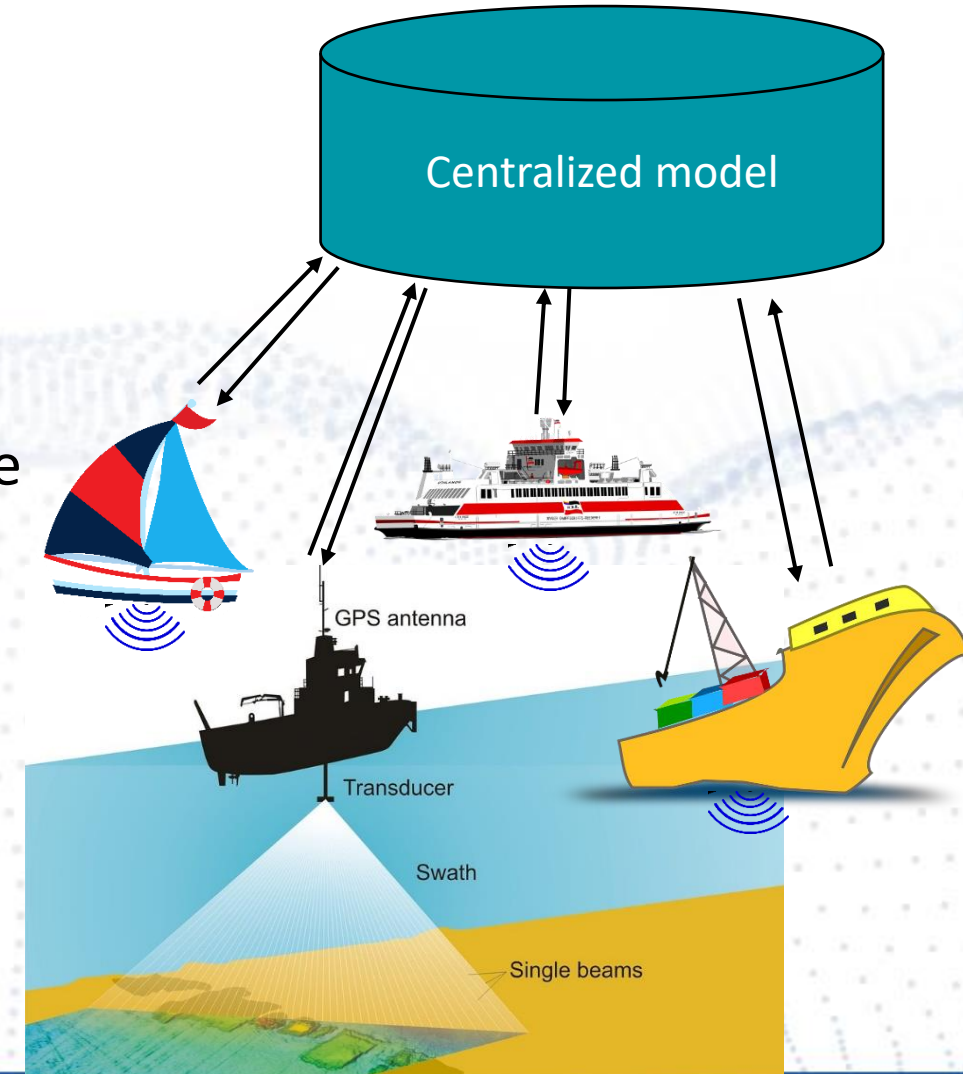
Edge-based in-situ Data Processing

Validate how

- Data can be decentrally collected and processed
- Data quality can be assessed on the edge
- Data criticality can be assessed in-situ
- Machine learning and FL can support this on the edge

To address the challenges







- Slow and expensive communication
- Often offline
- Unmonitored equipment and devices
- Difficult quality assessment



UC#5 Hardware Platform

The Gavian Data Collector Platform

Raspberry Pi 4

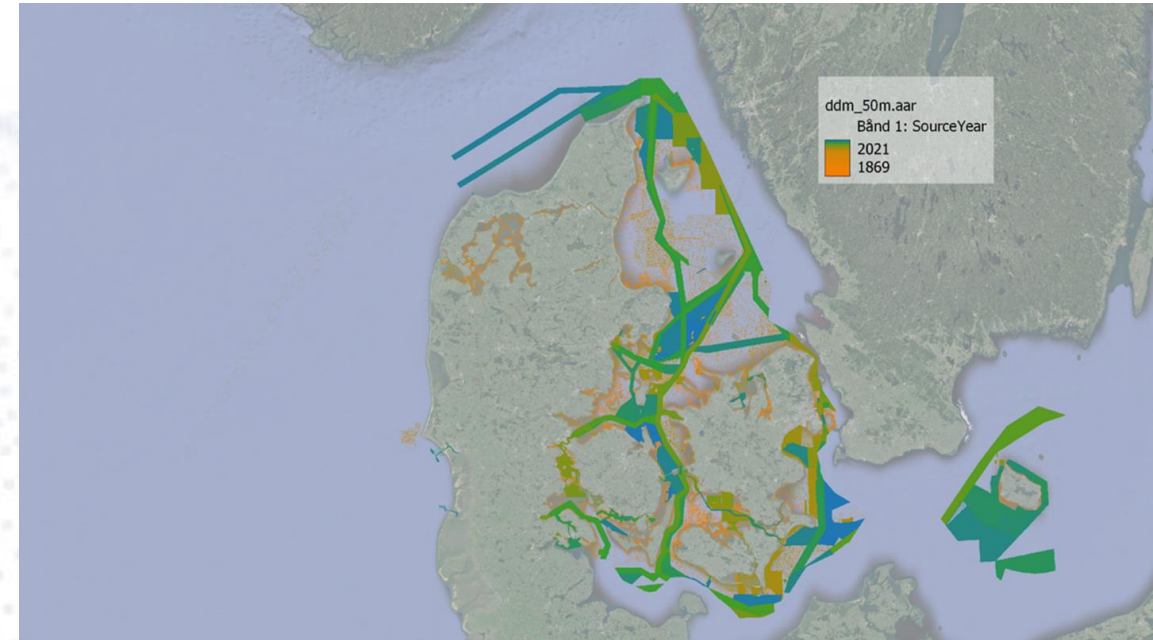
-  Hardware by Sternula A/S
-  Low power consumption
 -  Reduced computational powers
-  Optimized communication
 -  Transfer data on demand and priority
 -  VDES, mobile network, WiFi, etc.



UC#5 Targets

Validate Historic Chart Data

- Are historical depth data still valid?
 - The seafloor changes over time
 - Sand is moved by current
 - Harbors are excavated
- Where should surveying be prioritized

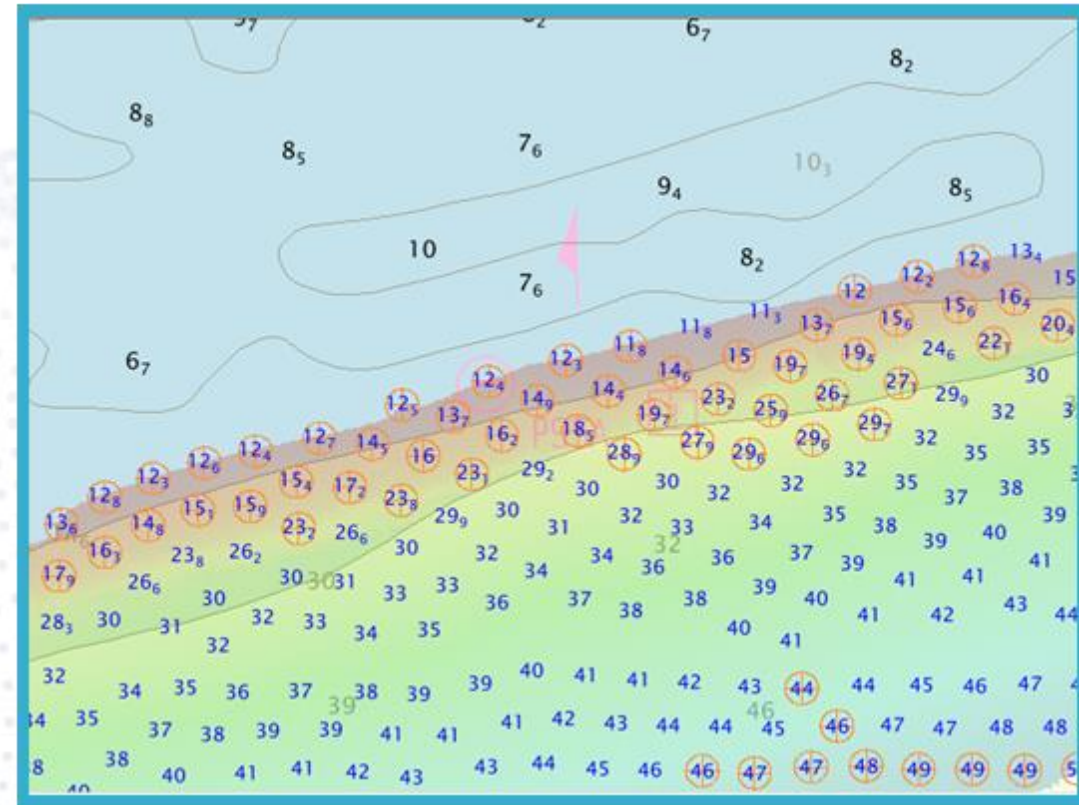


UC#5 Targets

Detect Chart Discrepancies

 Detect chart discrepancies

 Notify on critical findings



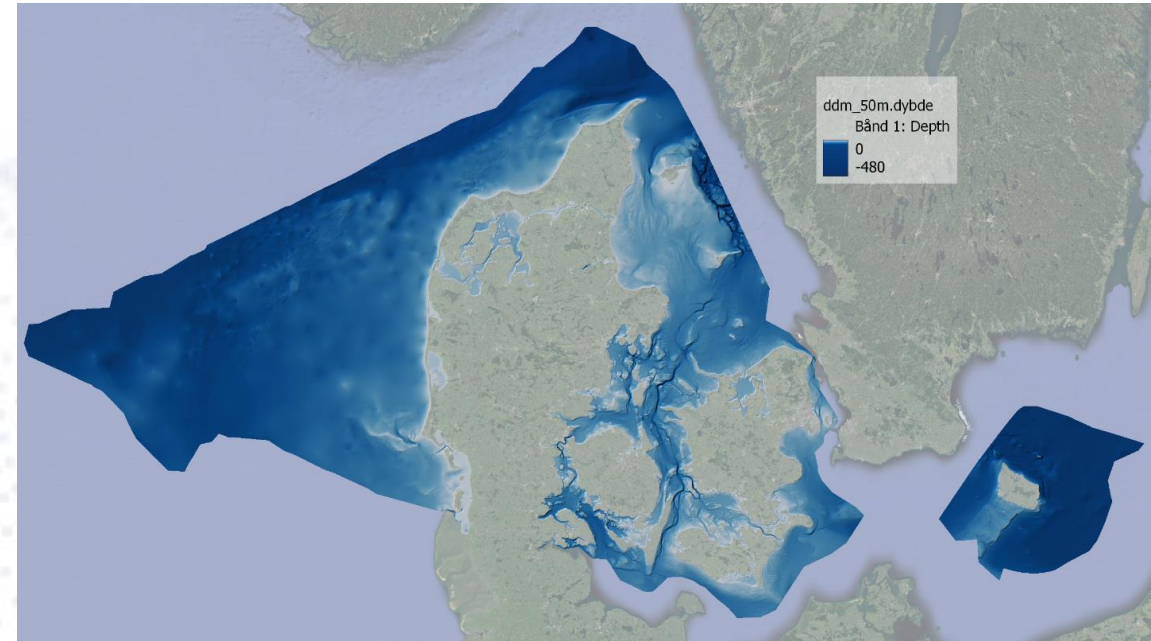
UC#5 Targets

Update Nautical Charts

 CSB data directly to charts?

 Is CSB data better than no data?

 Responsible for the quality in charts



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