



# **An e-Navigation Test-Bed for the North Sea region: interim findings of the ACCSEAS project**

**George Shaw**

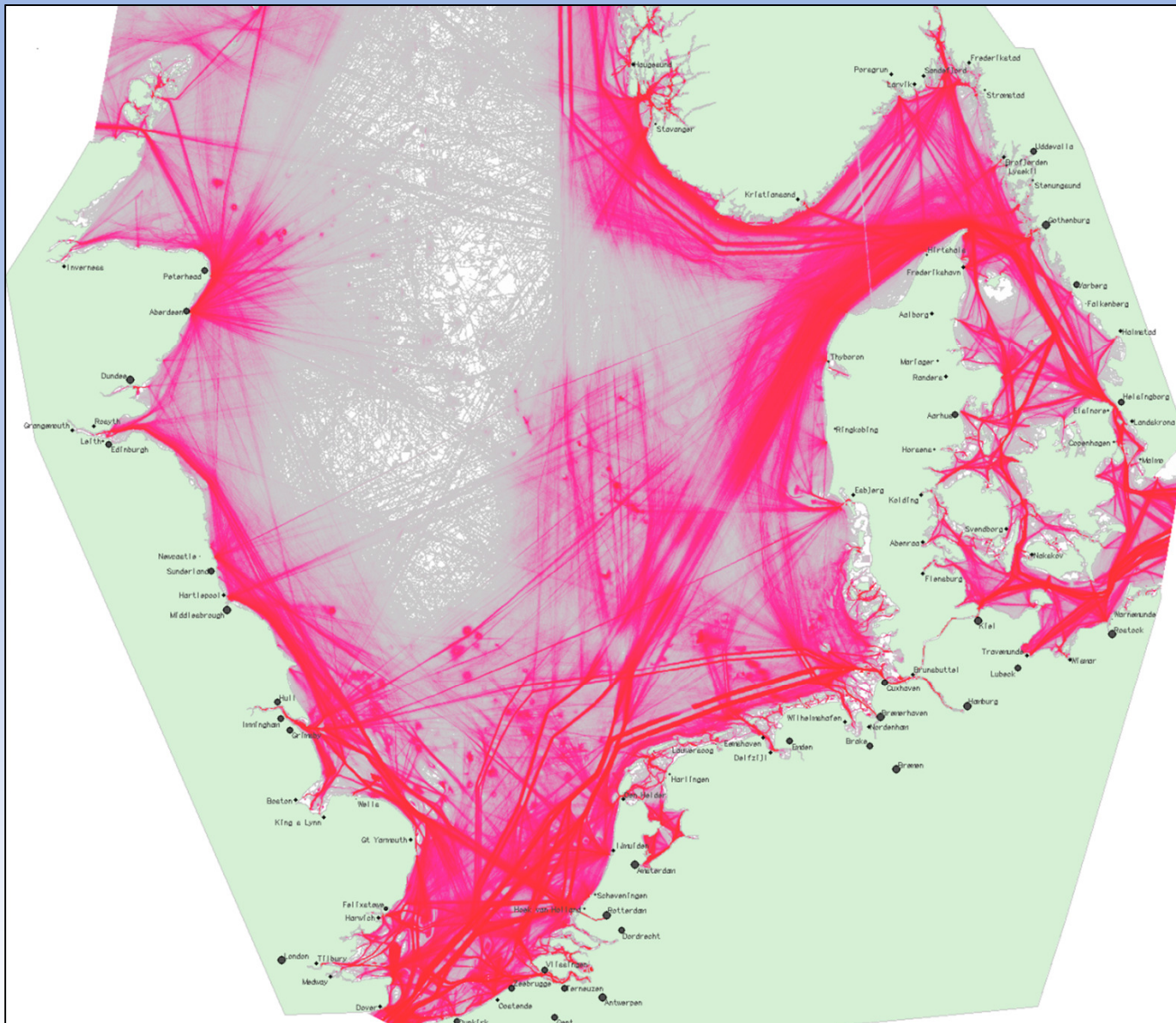
General Lighthouse Authorities of UK and Ireland

European Maritime Radionavigation Forum

IALA, St Germain-en-Laye

16 October 2013





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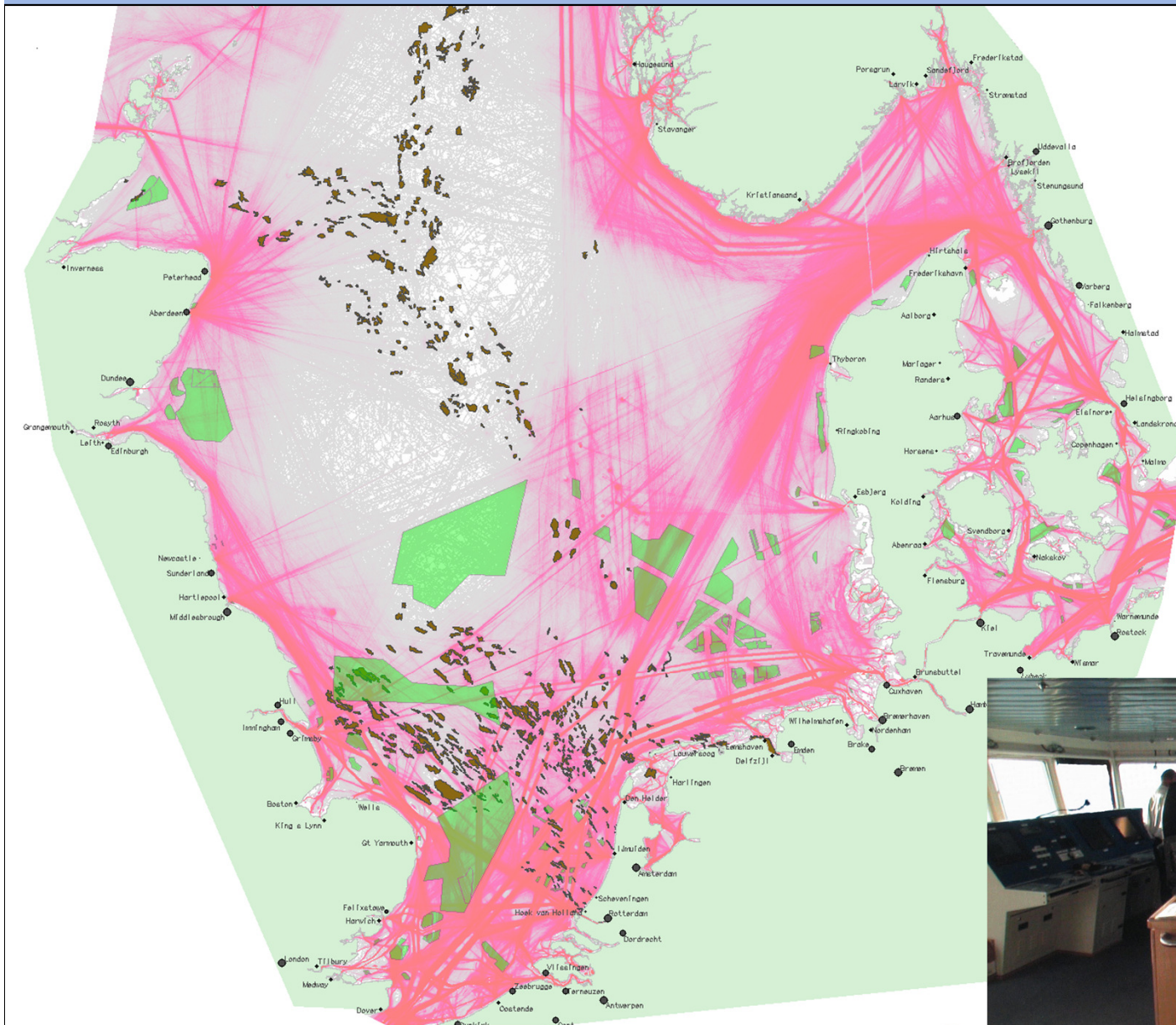


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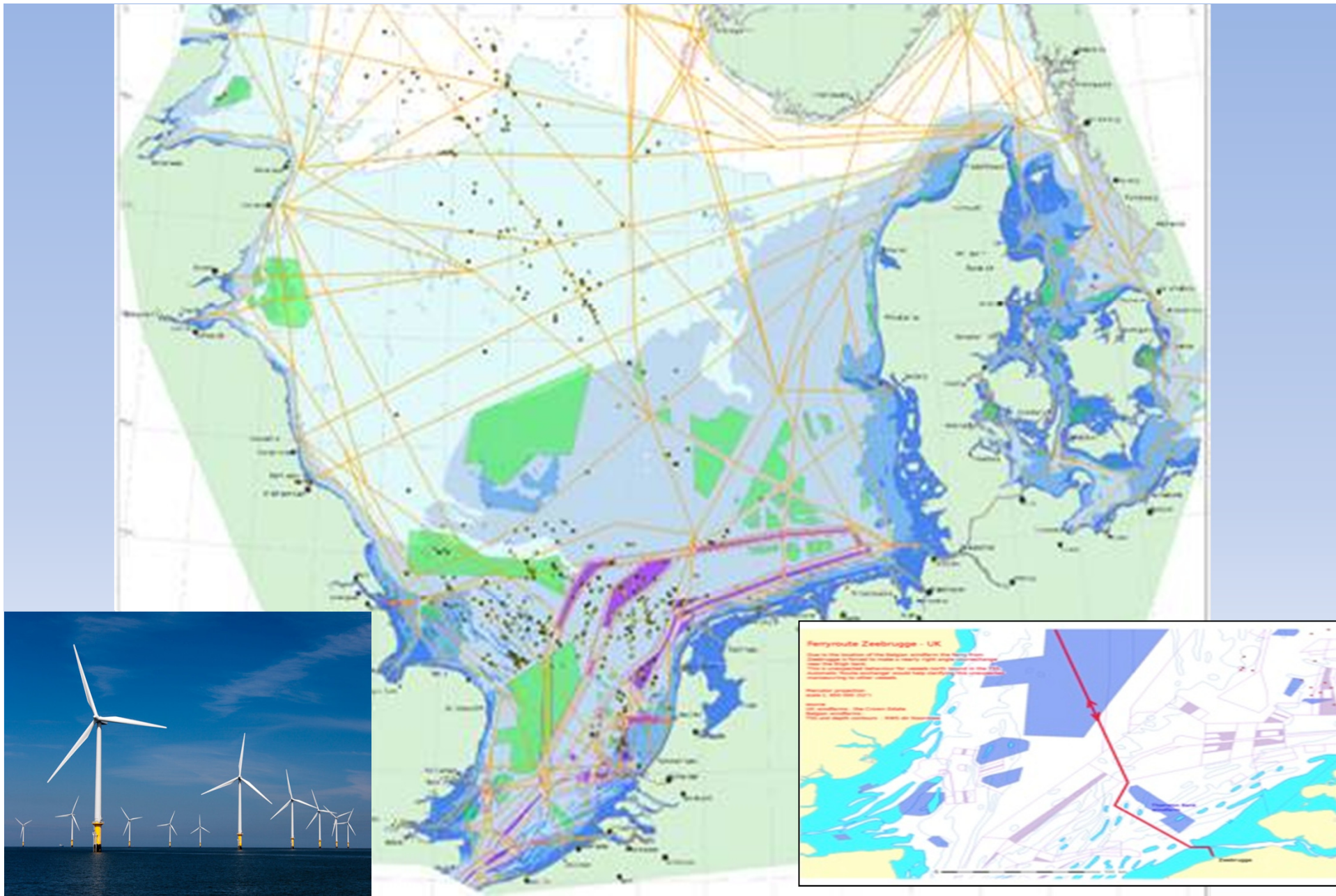


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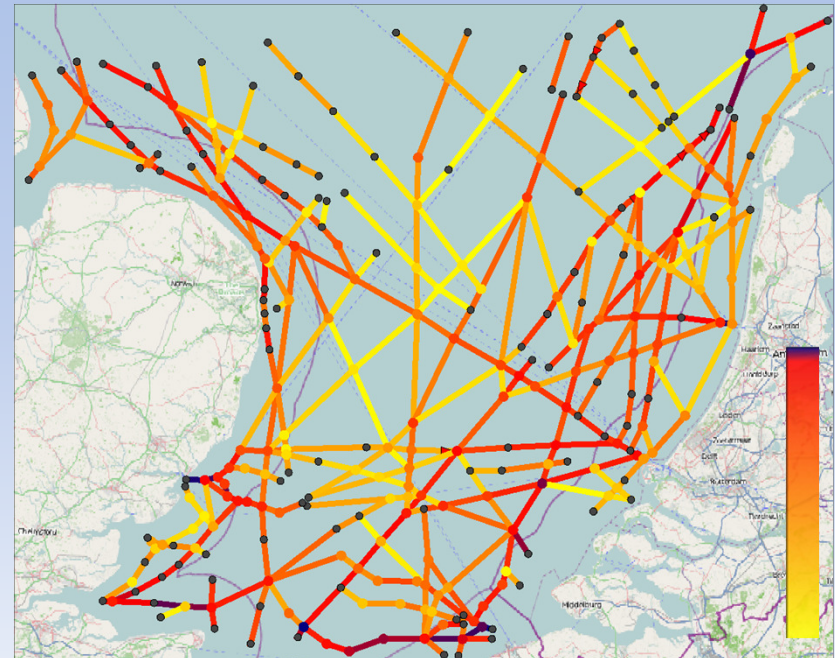
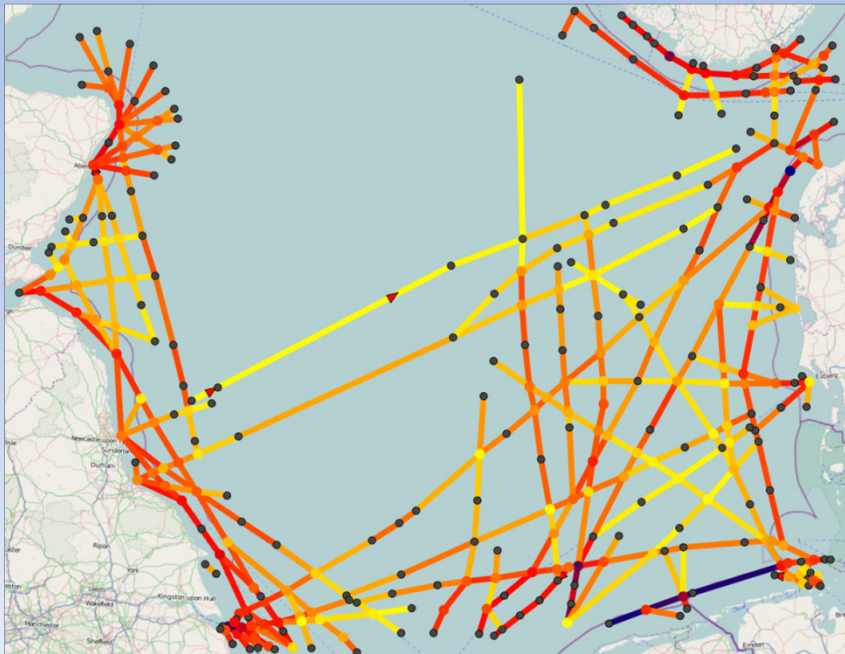


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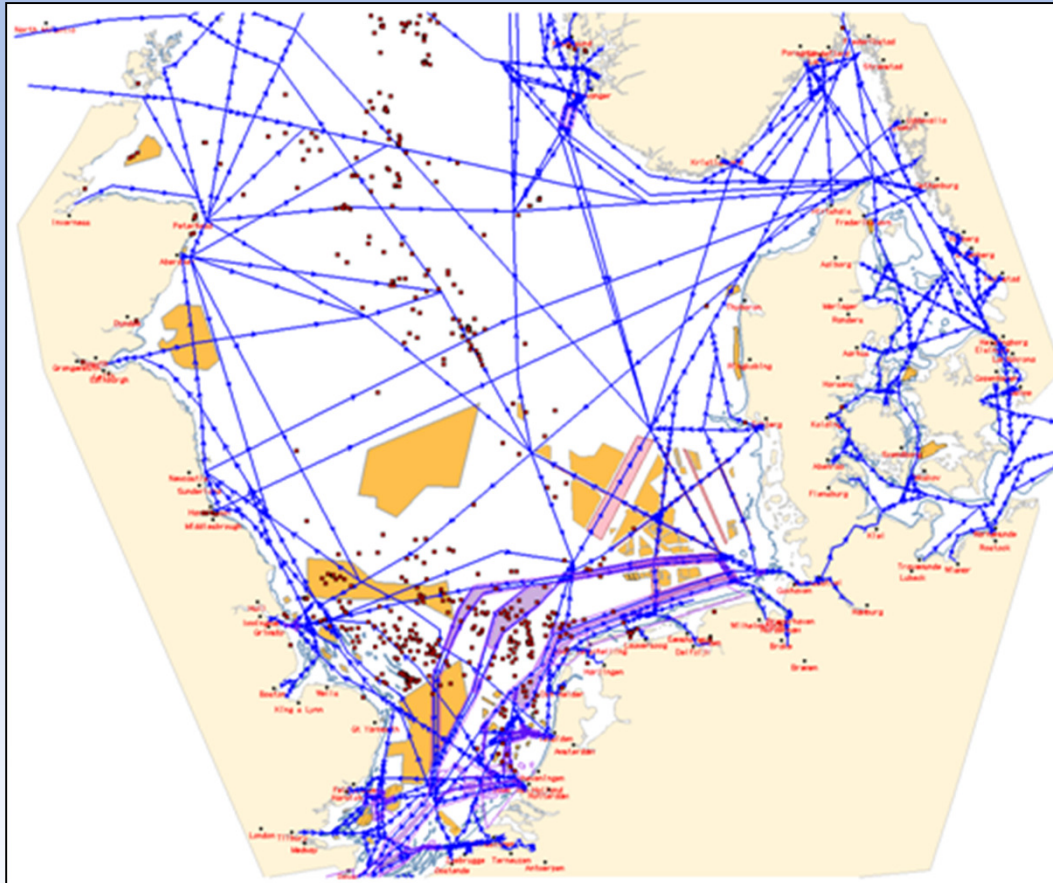
# Requirements & analysis: risk of collision and grounding



Using IALA Waterways Risk Assessment Program (IWRAP)

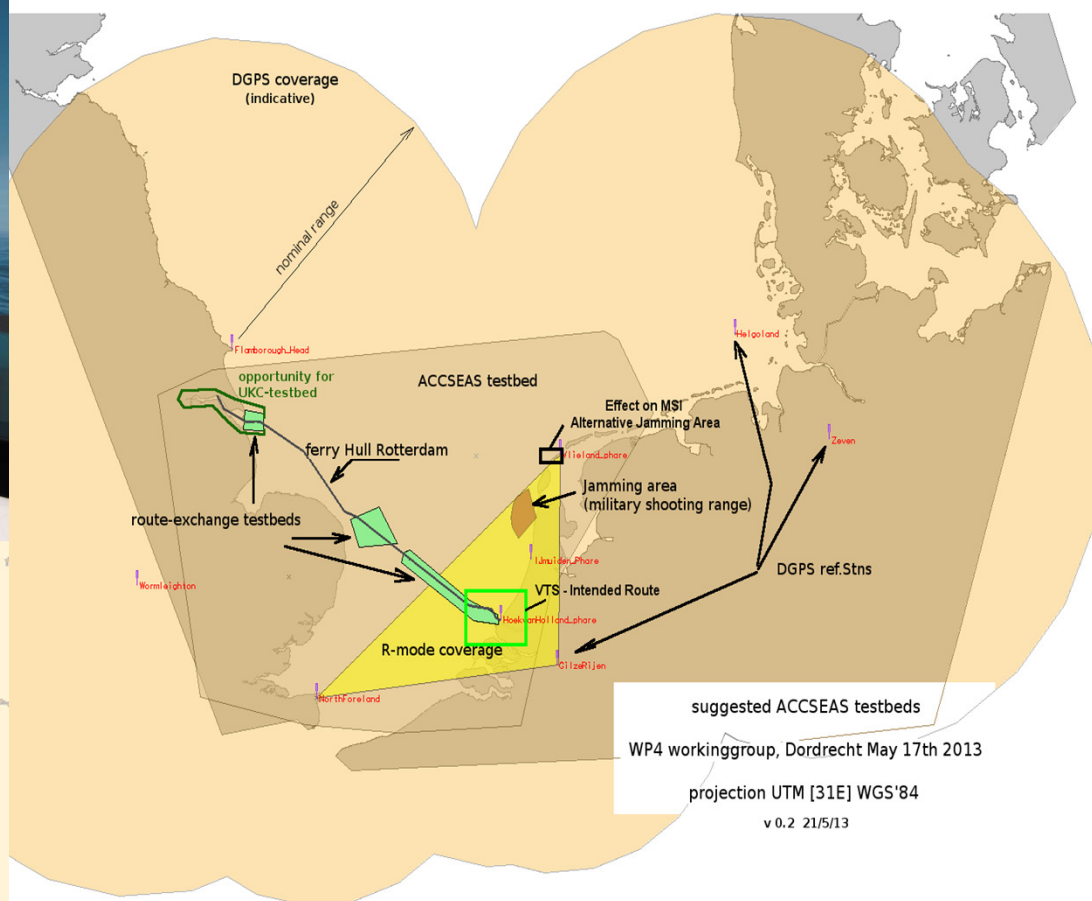
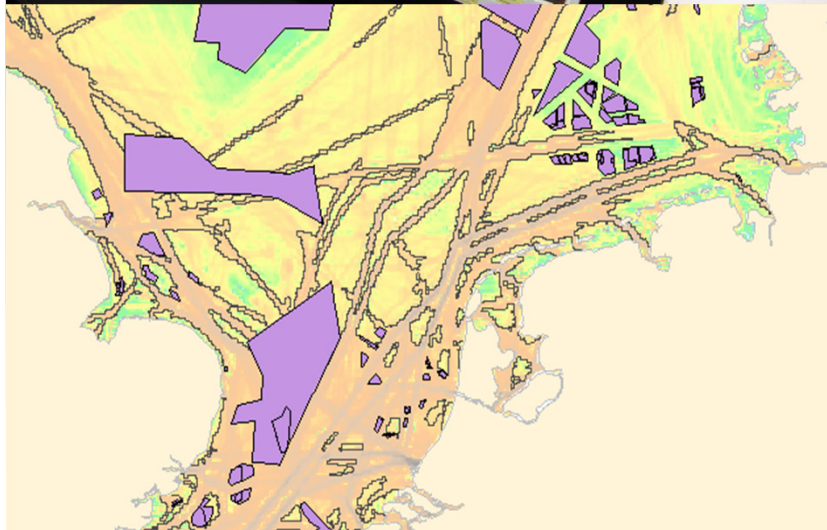


# Design of Route Topology Model (RTM)



- Flexible description of ship movements within constraints: maximize use of available sea space
- Define e-Navigation services & coverage to mitigate risks
- Assign services & service levels to RTM legs & nodes

# e-Navigation test-bed implementation

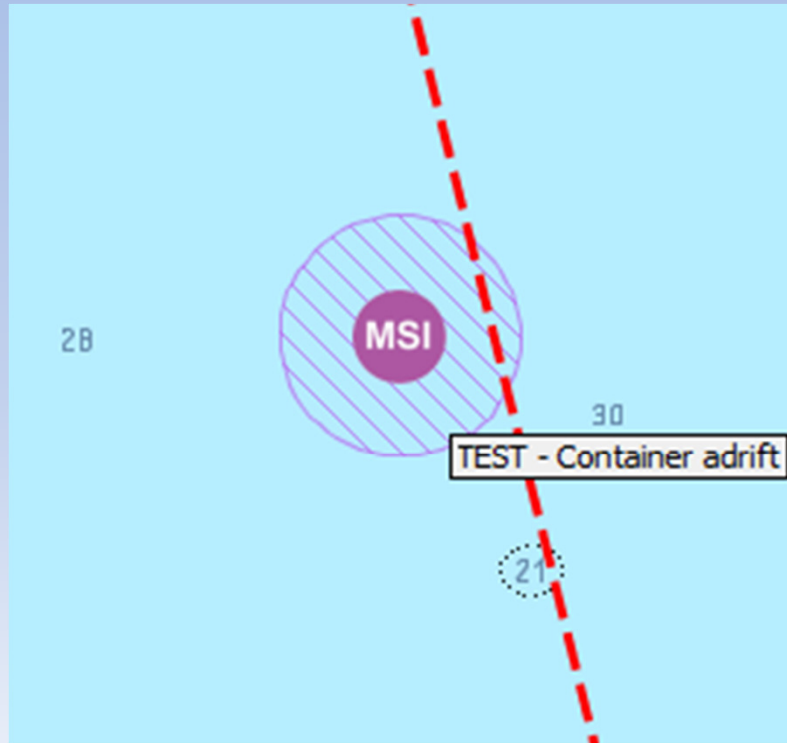


# Maritime Services Portfolio

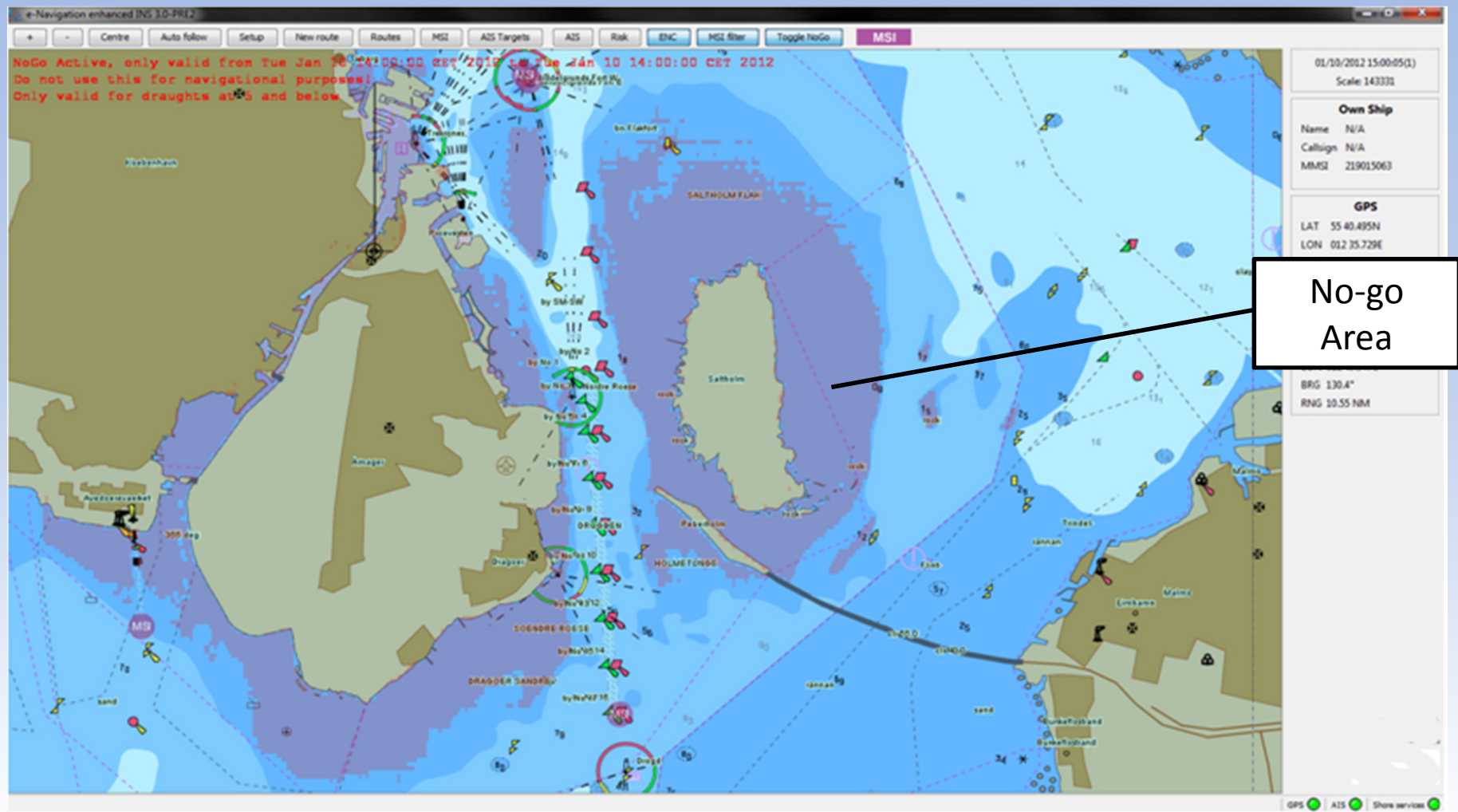
- Prototype services for the North Sea Region
  - Multisource Positioning (Resilient PNT)
  - Tactical Route Exchange
  - Mariners Notification Service (harmonised MSI / NM)
  - No-Go Service (Dynamic UKC)
  - Vessel Operations Co-ordination Tool
  - Automated FAL Reporting
  - Augmented Reality heads-up display
  - Dynamic ship movement prediction
  - Inter-VTS Exchange Service



# Mariners Notification Service

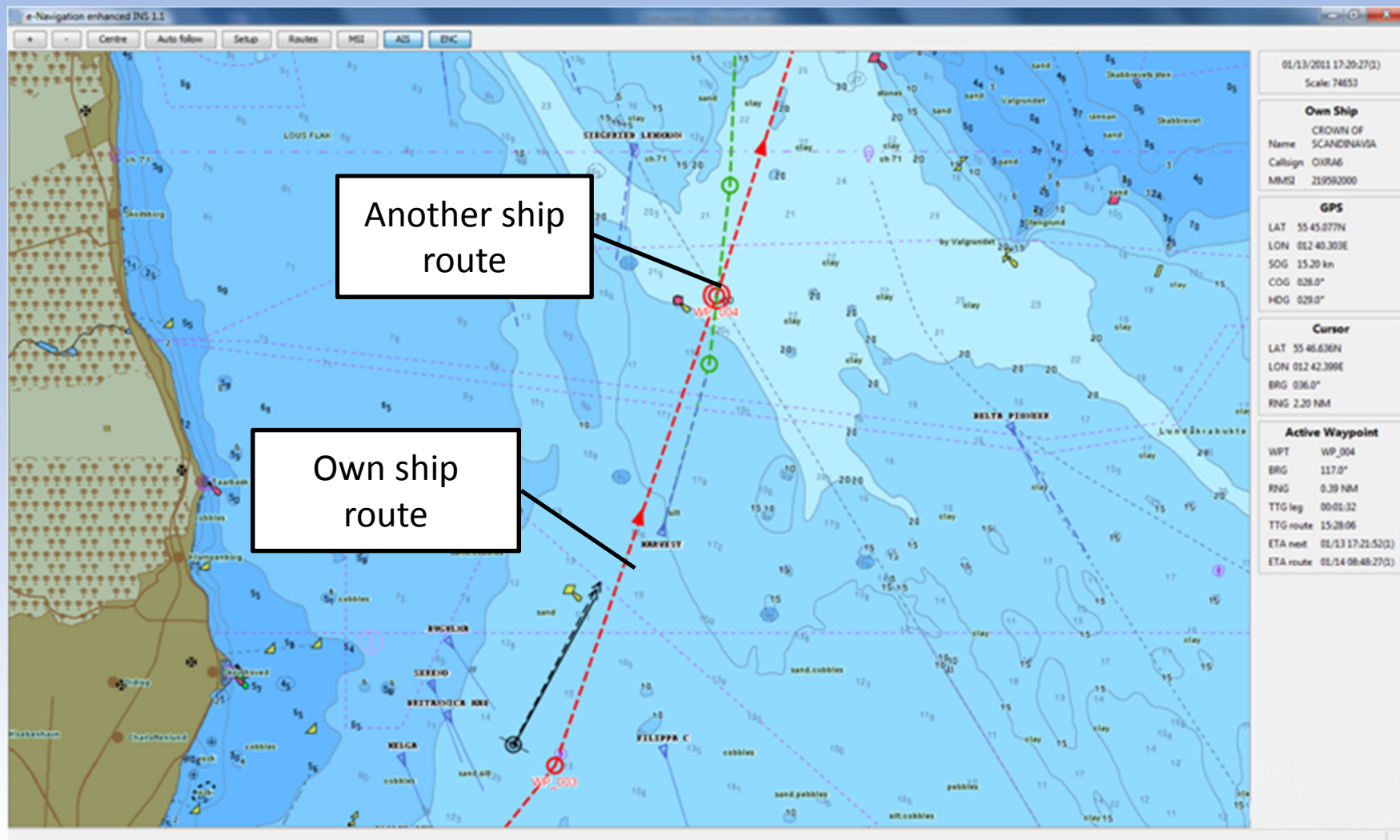


# No-go Areas



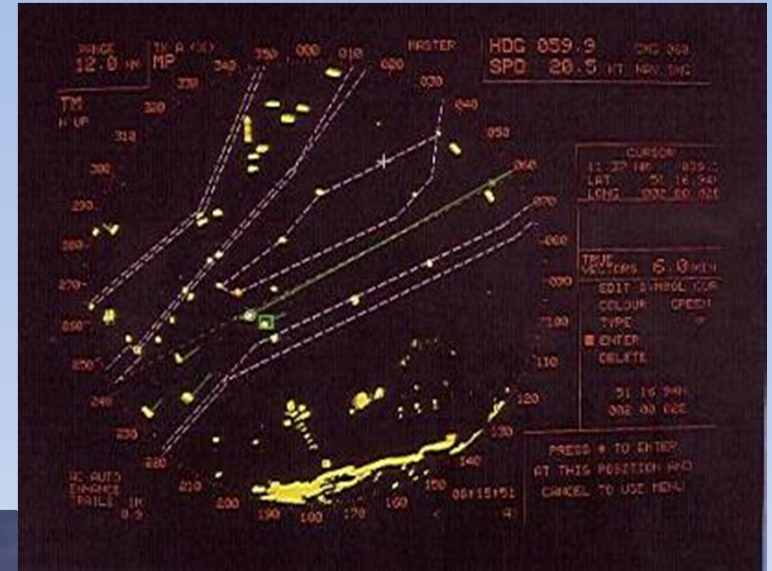


# Exchange of Intended Routes



# ACCSEAS trial: Radar Absolute Positioning

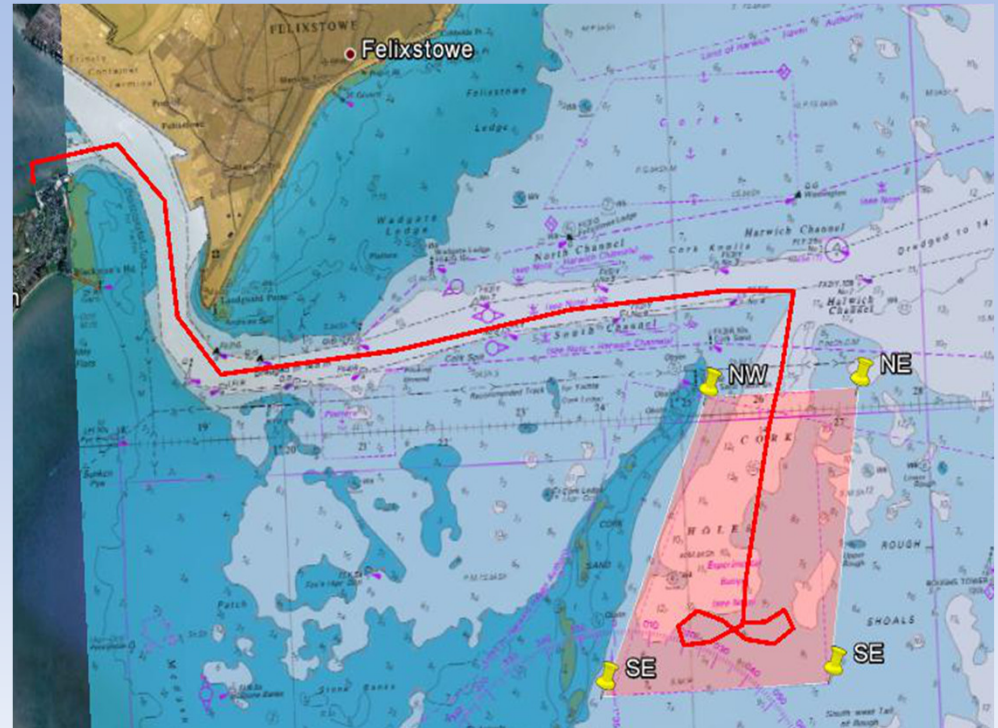
- Ensure independence from GNSS
  - GPS is everywhere!
- When triggered, modified radar beacons return an identity associated with the radar fix – for a known reference position
- Early trials have provided promising results – depending on number, range and geometry of radar beacons
- Generally need  $\geq 2$  radar beacons at less than 10 miles range and good geometry to achieve order of 10m accuracy





# ACCSEAS GPS Jamming Trial of Resilient PNT

- Vessel approaching a jammer on another vessel or on coastline
- Jamming signal strength increases as vessel approaches
- Demonstrate two runs in real-time:
  - **without** the prototype system enabled – GPS only
  - **with** the prototype system enabled – Resilient PNT



# Reported GPS positions



**Green trace = GPS**

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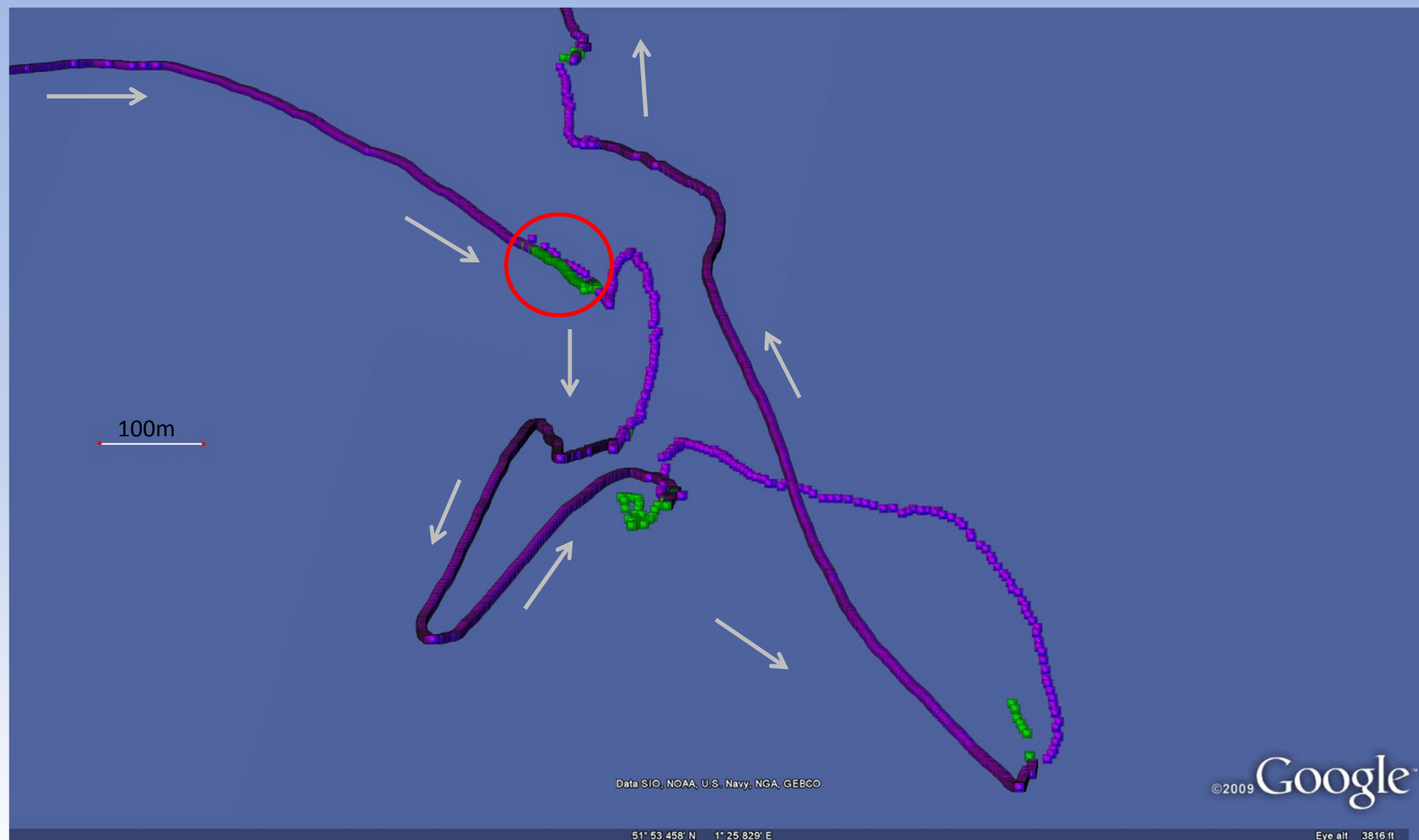
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# Resilient PNT positions



**Green trace = GPS, Purple trace = Resilient PNT**

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# ACCSEAS Outcomes

- Geographic Information System (GIS)
  - traffic patterns, complex sea space, route topology model, infrastructure, MSP coverage areas & service levels
- Ship equipment and shore infrastructure prototypes
- Evaluation of technology and **human factors**
- **Training Needs Analysis** and training packages
- Develops e-Navigation sustainability plan (2015 to 2020)
- Legacy for future coordination of North Sea e-Navigation
- **Stakeholder Workshops** & **Annual ACCSEAS conference**
  - Oslo 6/7 November 2013      - **Edinburgh 4/6 March 2014**



# Thank You



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[www.accseas.eu](http://www.accseas.eu)

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