

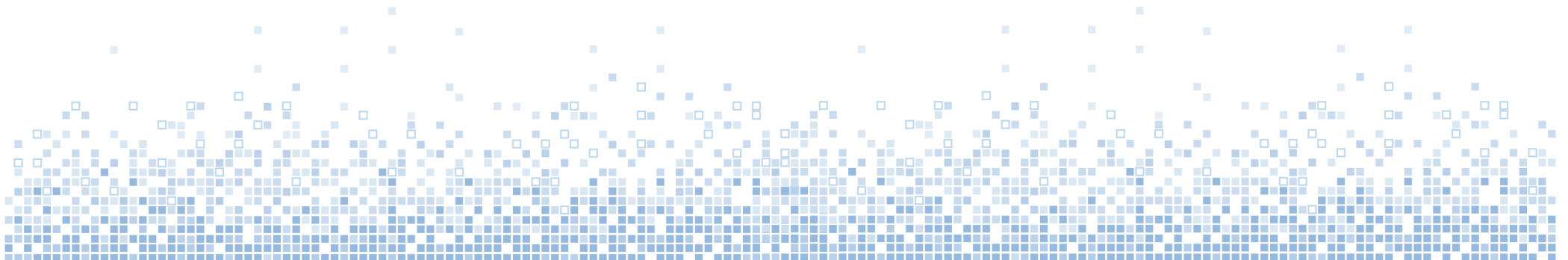
The Development of AIS and an Aid to Navigation

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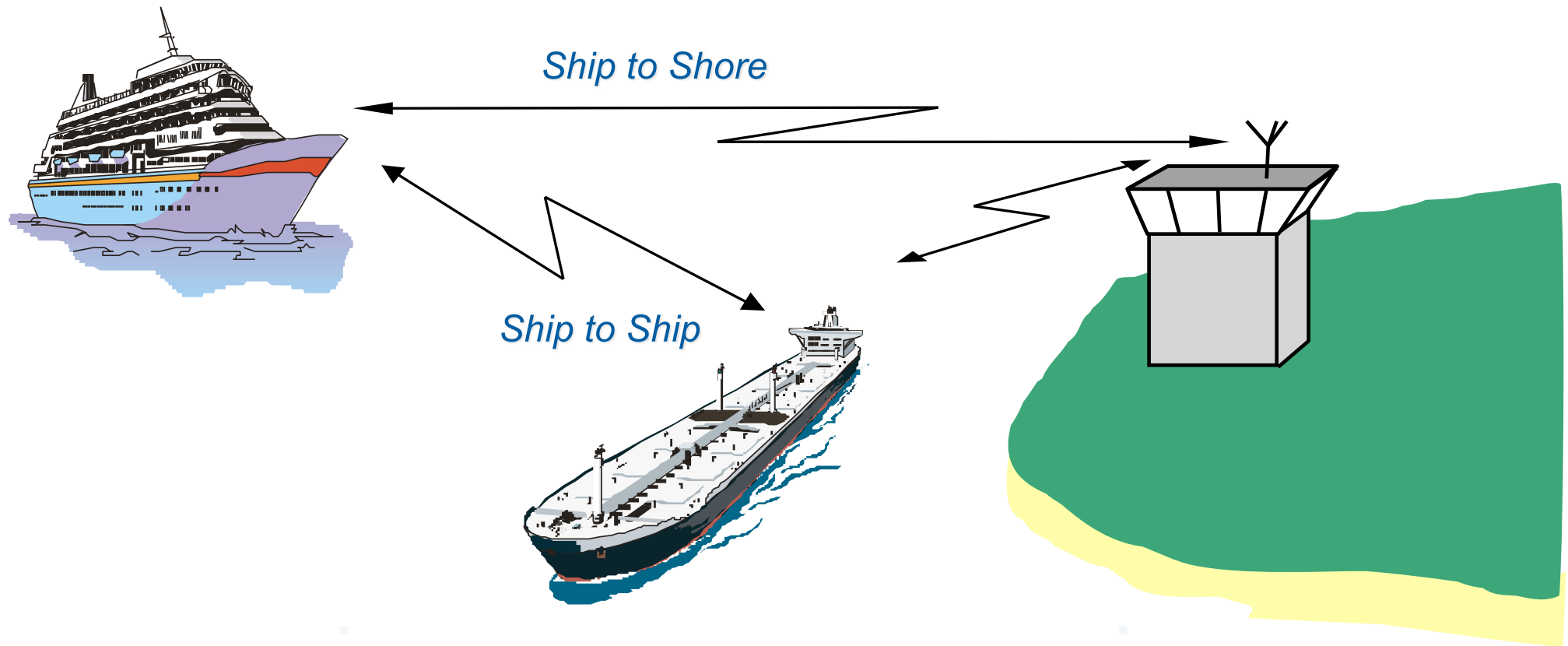
¹General Lighthouse Authorities of the United Kingdom and Ireland

²Trinity House, United Kingdom

RIN NAV08 & ILA 37 – London, October 2008



Introduction to AIS



The International Maritime Organisation (IMO) mandated the use of AIS by all vessels covered by the Safety of Life at Sea (SOLAS) convention (vessels over 300 tonnes or those carrying passengers) to be fitted by July 2004.

Introduction to AIS

Static information

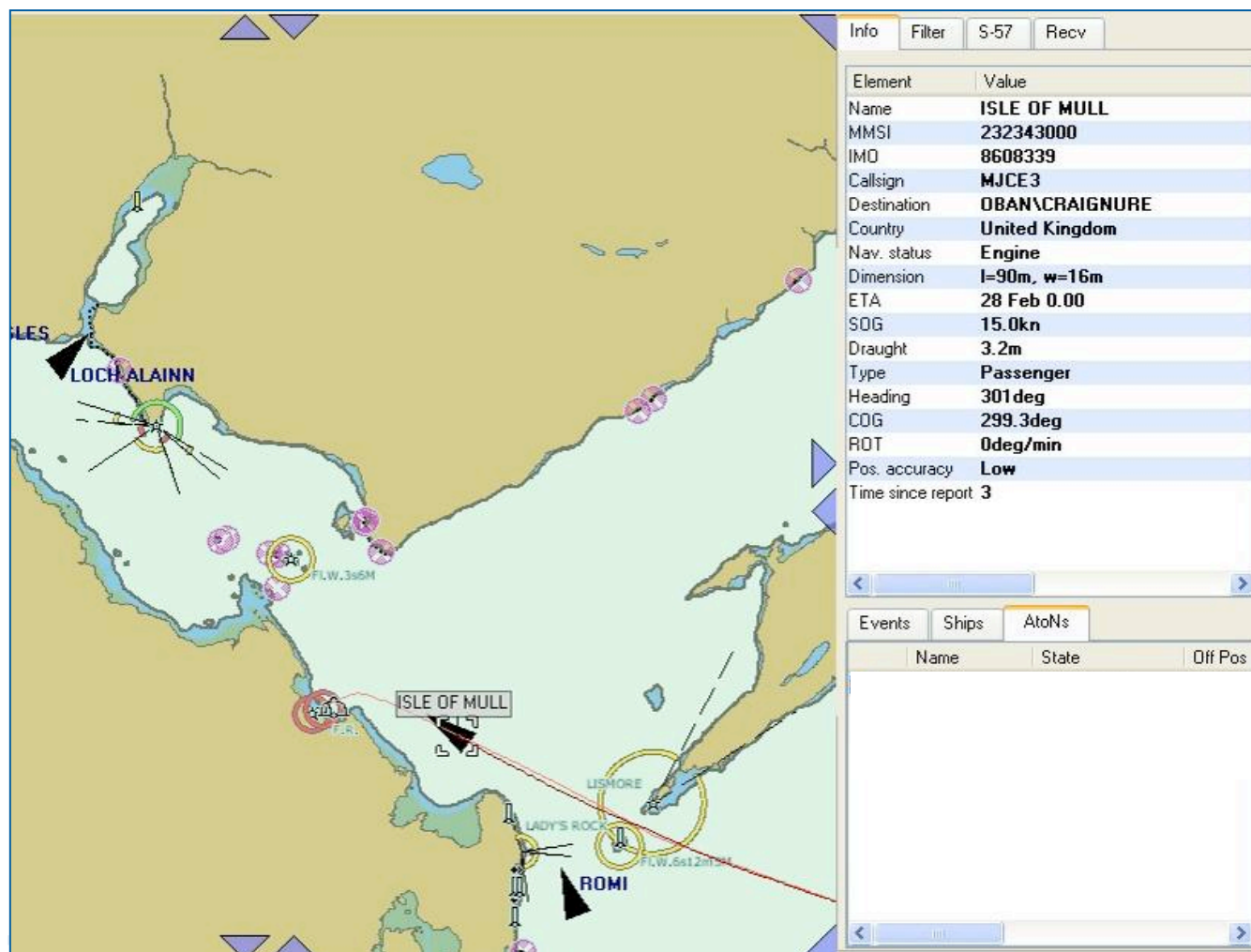
- Name, call sign
- MMSI
- Dimensions
- Type

Voyage related information

- Draught
- Cargo type
- Destination
- ETA

Dynamic information

- Position – LAT/LNG
- Course and speed over ground
- Heading
- Rate of turn



AIS as an Aid to Navigation (AtoN)

AIS can be used to provide:

- Virtual AtoN
- Synthetic AtoN
- AtoN AIS

AIS was officially declared a beacon in an amendment of the merchant shipping act in 2006.



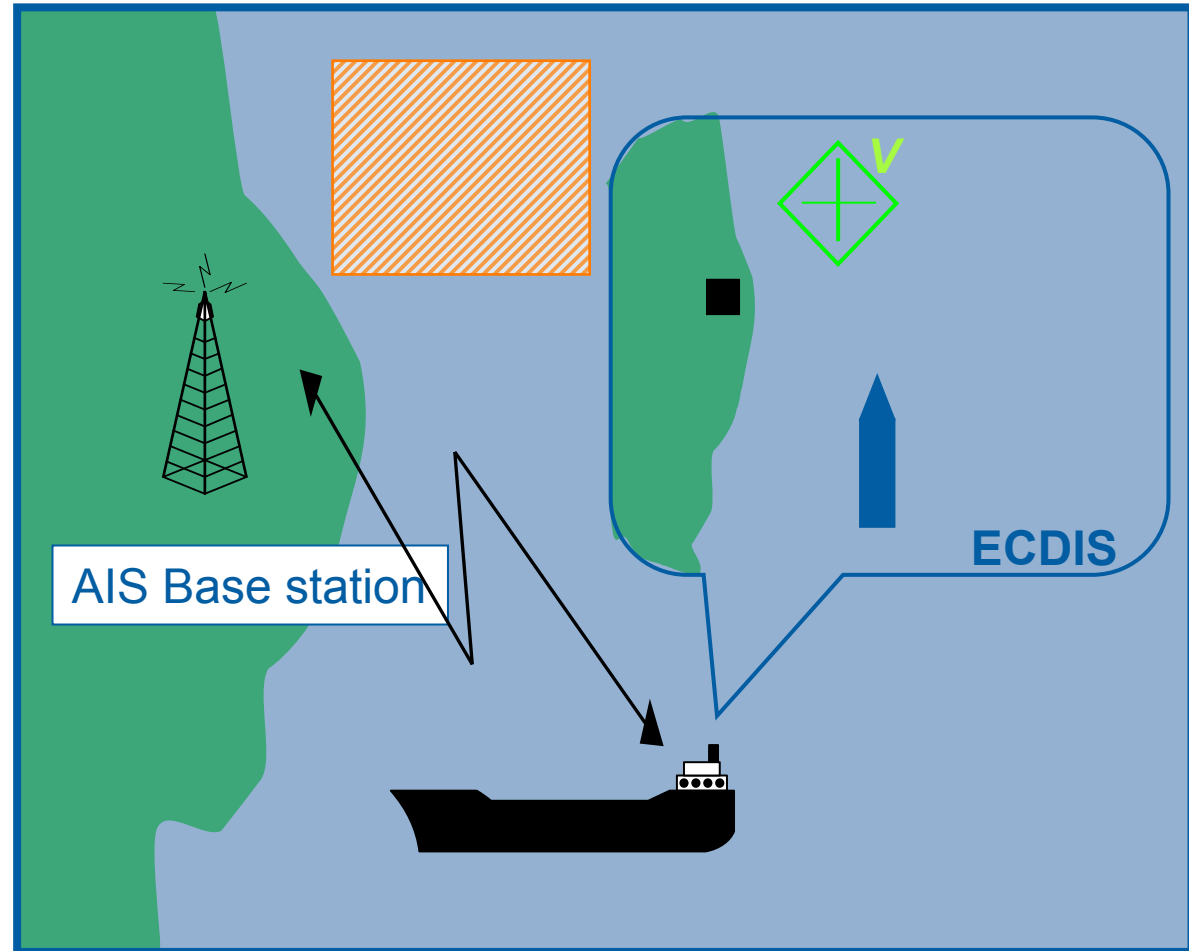
Virtual AtoNs

No physical AtoN exists

A local AIS base station broadcasts information about the AtoN so that it appears on the vessels ECDIS.

The mariner is able to “see” the AtoN and interrogate it to seek additional information.

Incidents can be marked in a timely manner before physical AtoNs are deployed



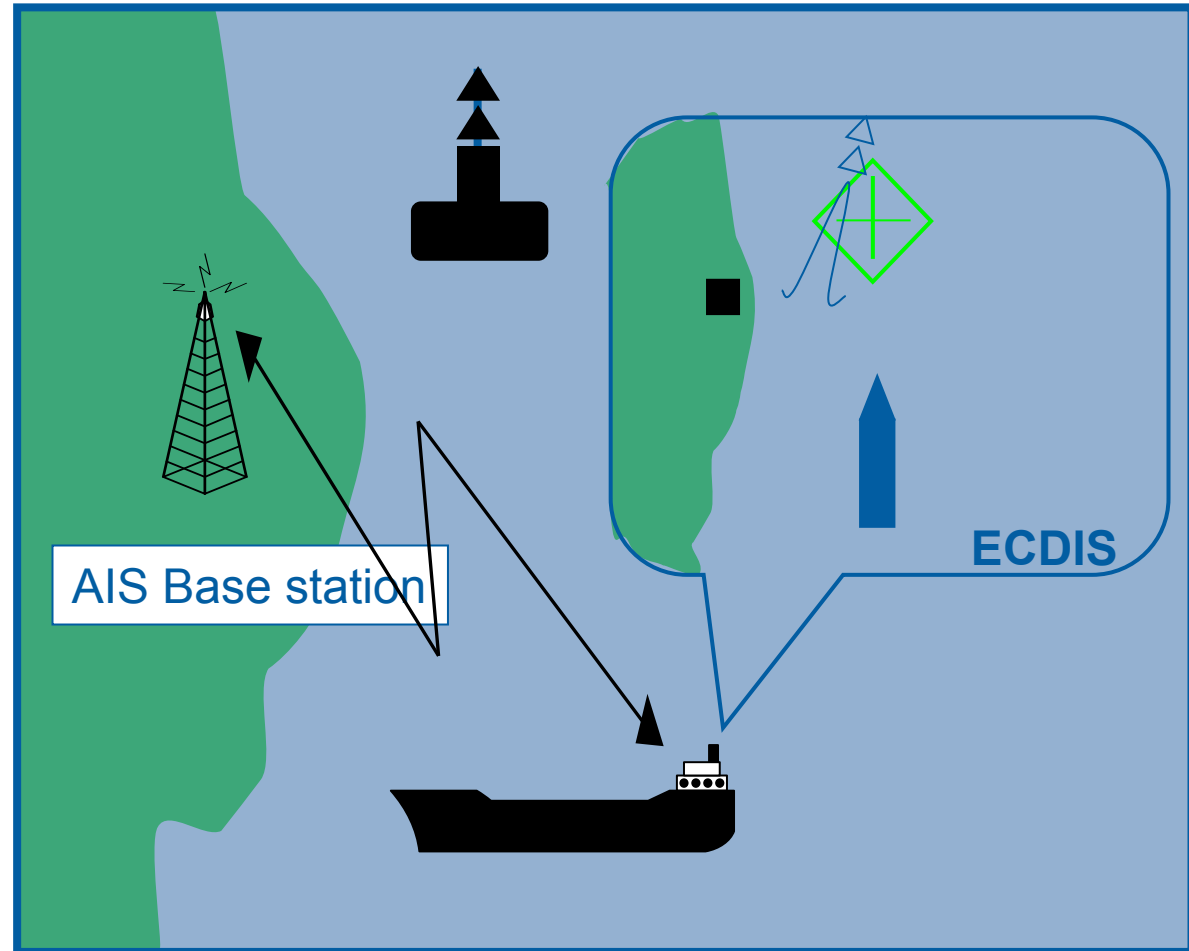
Synthetic AtoNs

A physical AtoN is present.

A local AIS base station broadcasts information about the AtoN as if it was from the AtoN itself.

If the AtoN is linked to the base station then the true position can be broadcast to the mariner.

The mariner is able to monitor the AtoN through AIS.

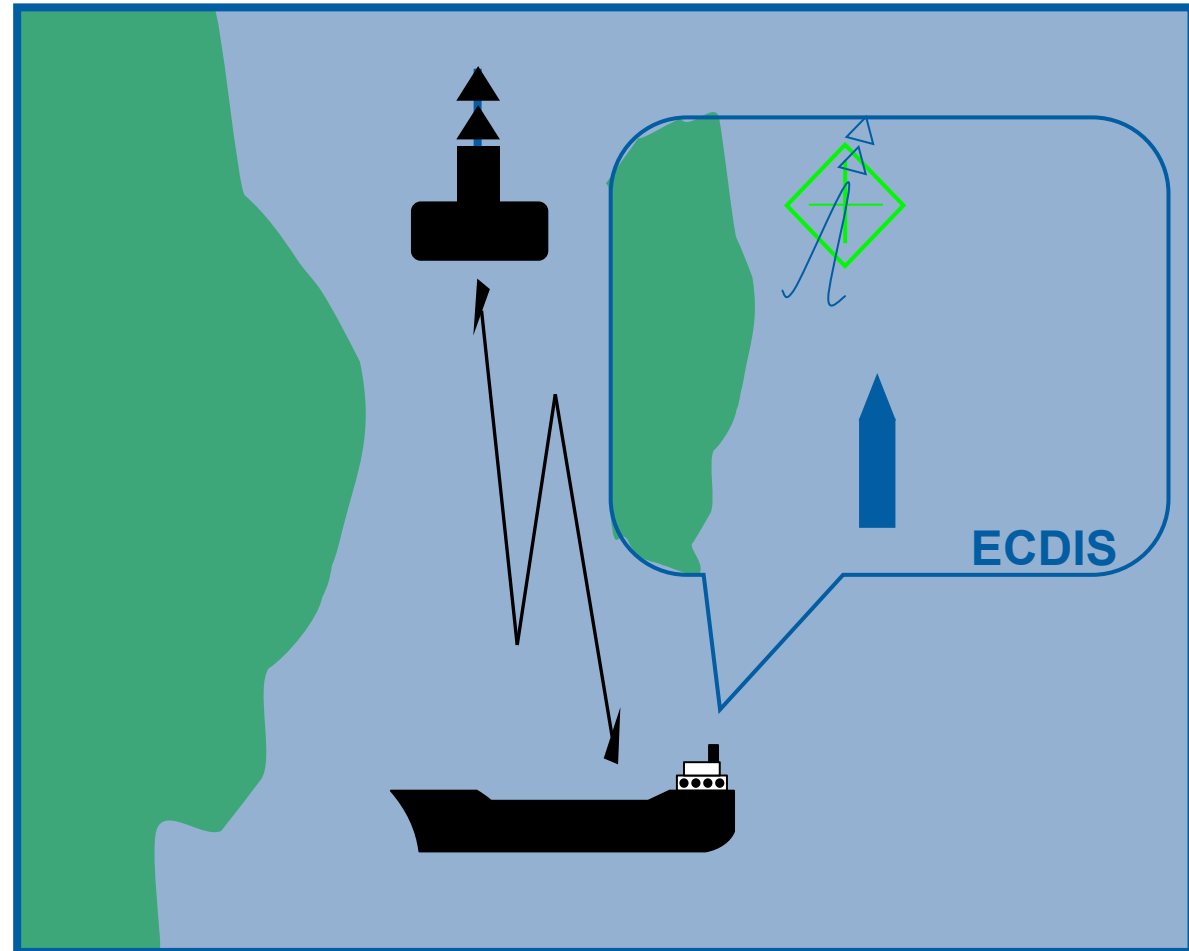


AtoN AIS

A physical AtoN is present and fitted with an AtoN AIS unit.

The AtoN AIS unit broadcasts information on the AtoN, including:

- Current position
- AtoN status
- Control information
- 3rd party information (Weather, etc)



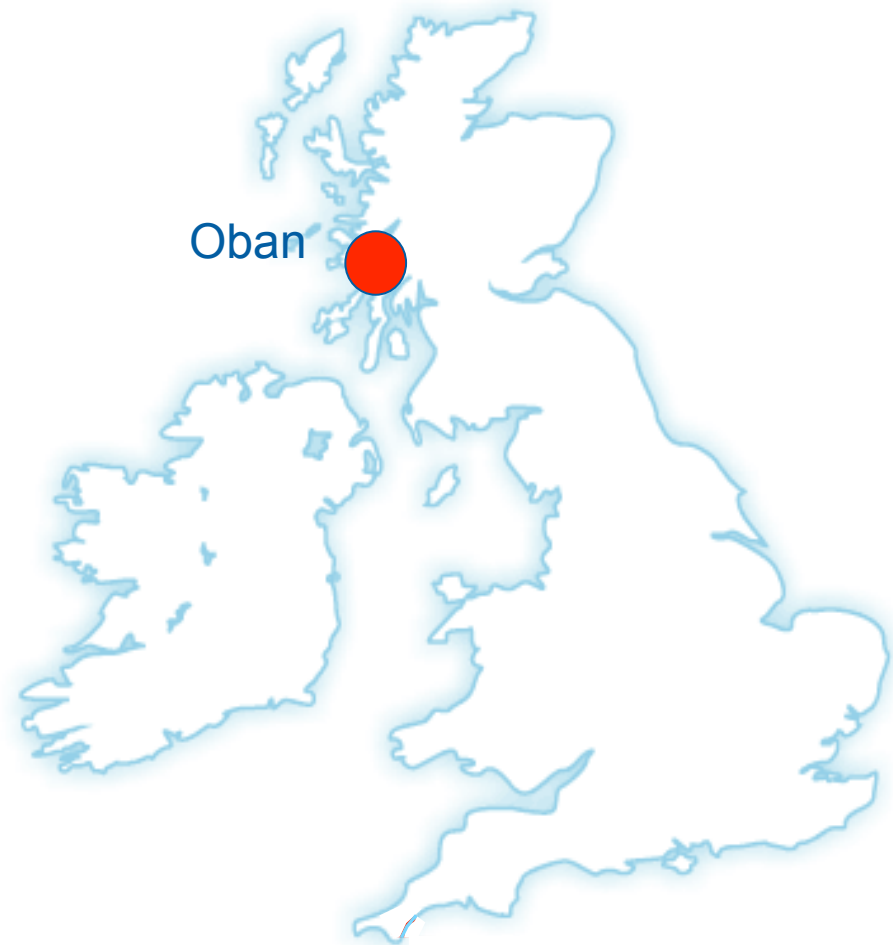
AIS Demonstrations

The benefits of AIS as an AtoN have been demonstrated in two events this year.

Virtual AtoNs were demonstrated as part of the MARUSE project.

Electronic Aids to Navigation Systems Information (E-ANSI) was demonstrated as part of an IALA project.

Both were demonstrated at the Northern Lighthouse Board depot in Oban, Scotland.



Virtual AtoN Demonstration

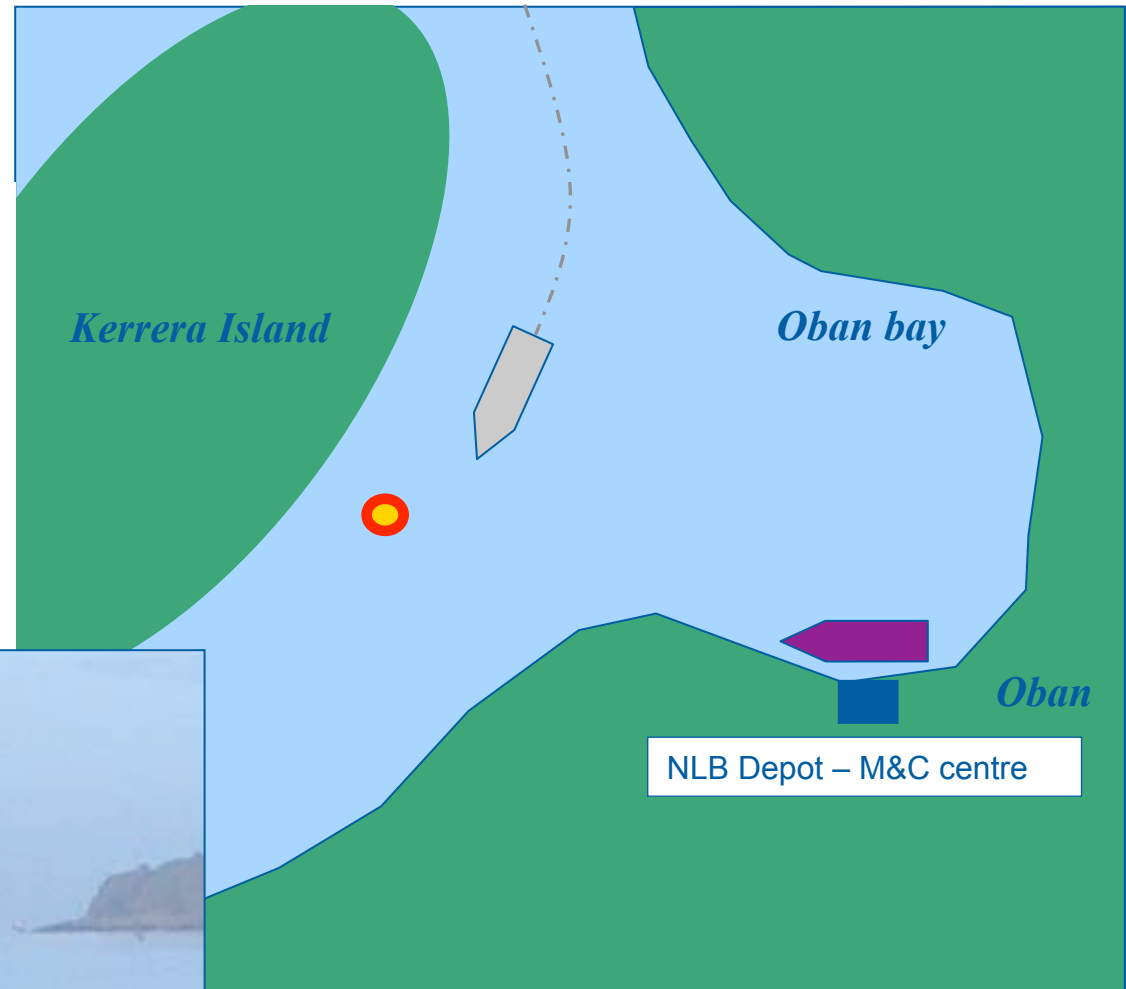
The grey vessel enters the port and suffers a failure – blocking the channel.

Key

Grey vessel – casualty

Purple vessel – NLV Pharos

● – *Emergency Wreck marking buoy*



Virtual AtoN Demonstration

On notification of the casualty Virtual AtoNs are broadcast.

A local AIS base station was used to generate the Virtual AtoNs.

NLV Pharos leaves port and collects the Emergency Wreck Marking Buoy.



Virtual AtoN Demonstration

NLV Pharos deployed the
Emergency Wreck Marking
Buoy over the east virtual
AtoN.

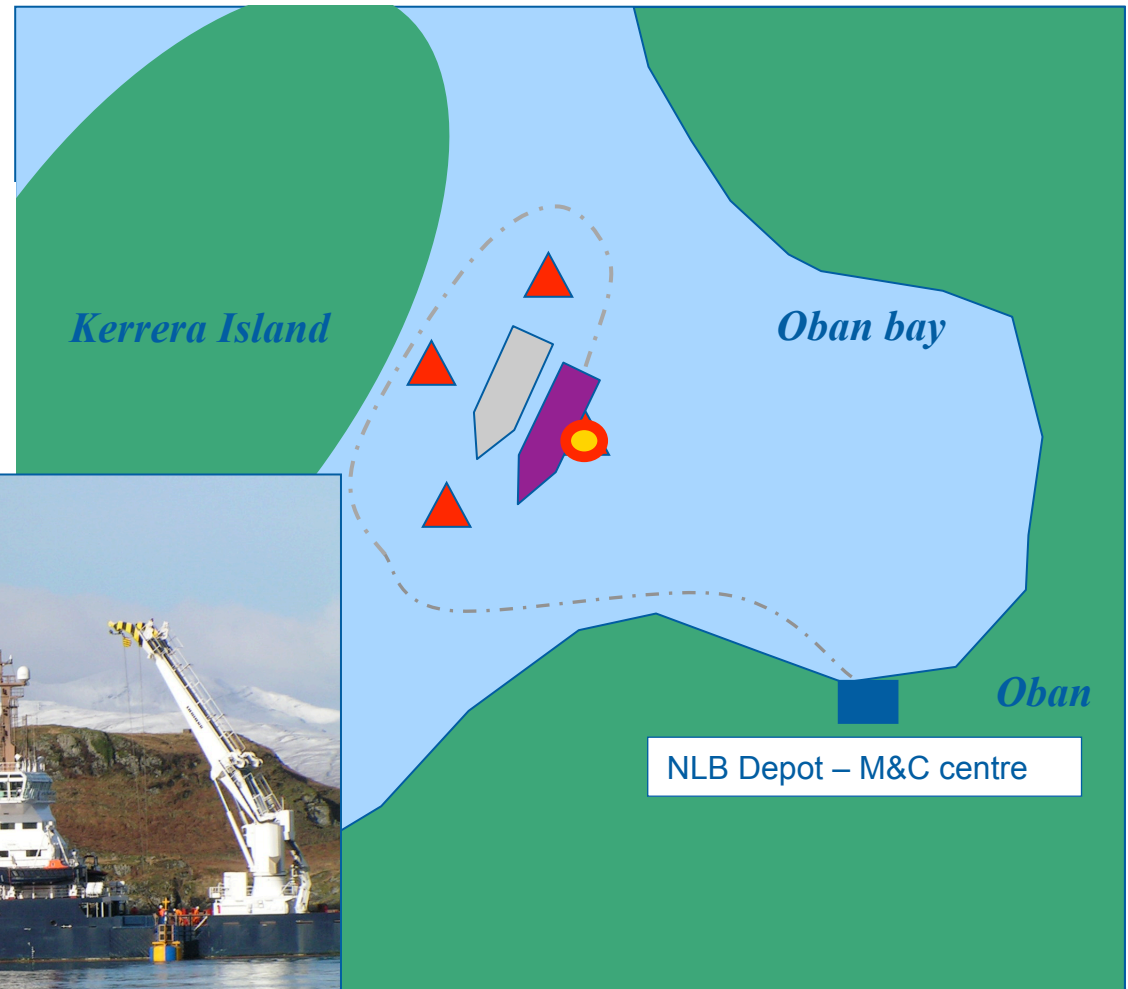


Image source: Dr. C. Dixon

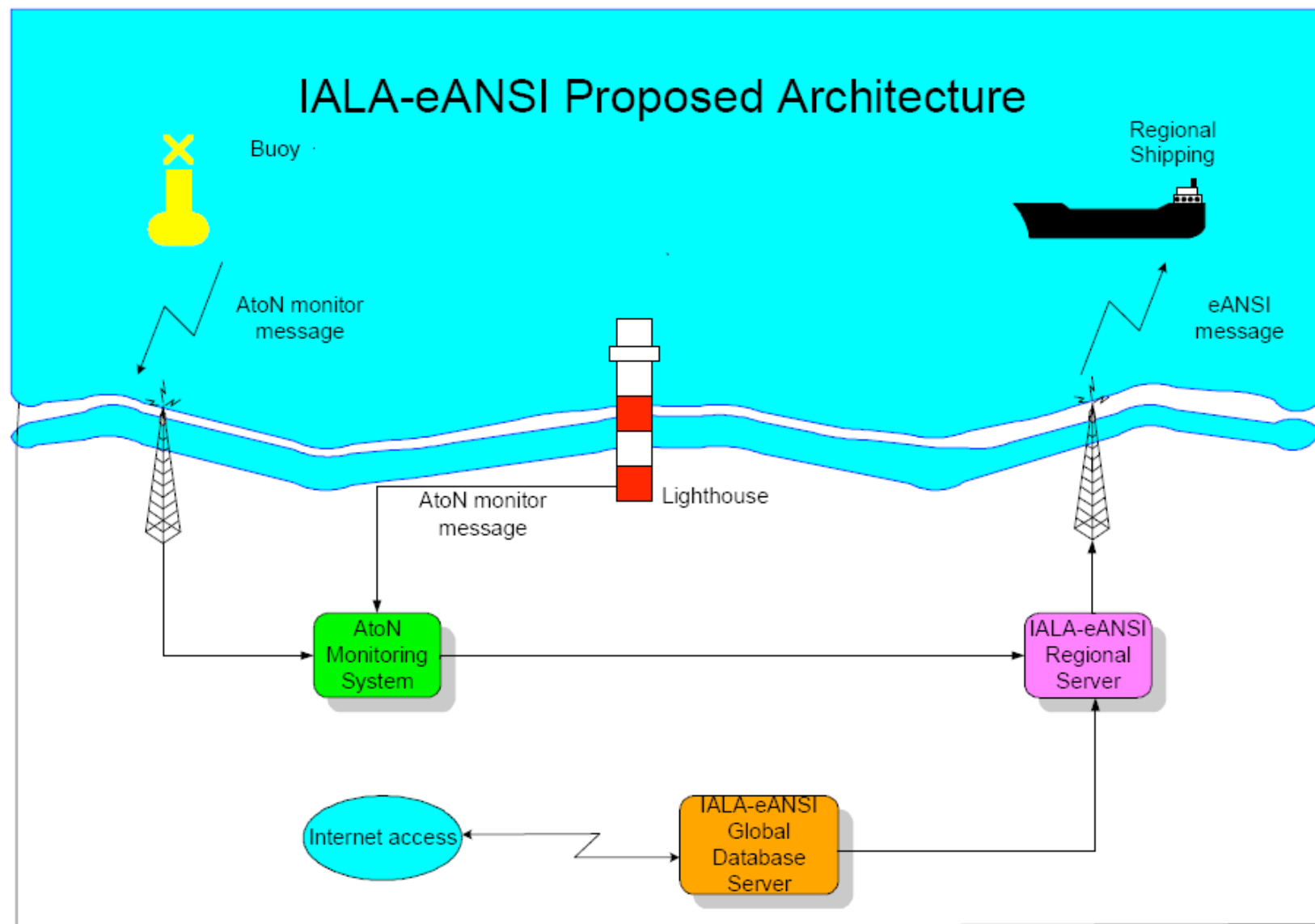
E-ANSI

Electronic Aids to Navigation Systems Information (e-ANSI) is a system being developed by IALA to provide real-time feedback to the status of AtoNs.

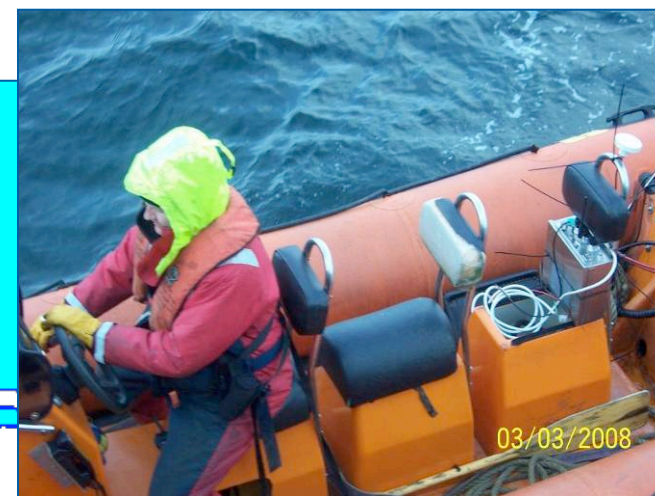
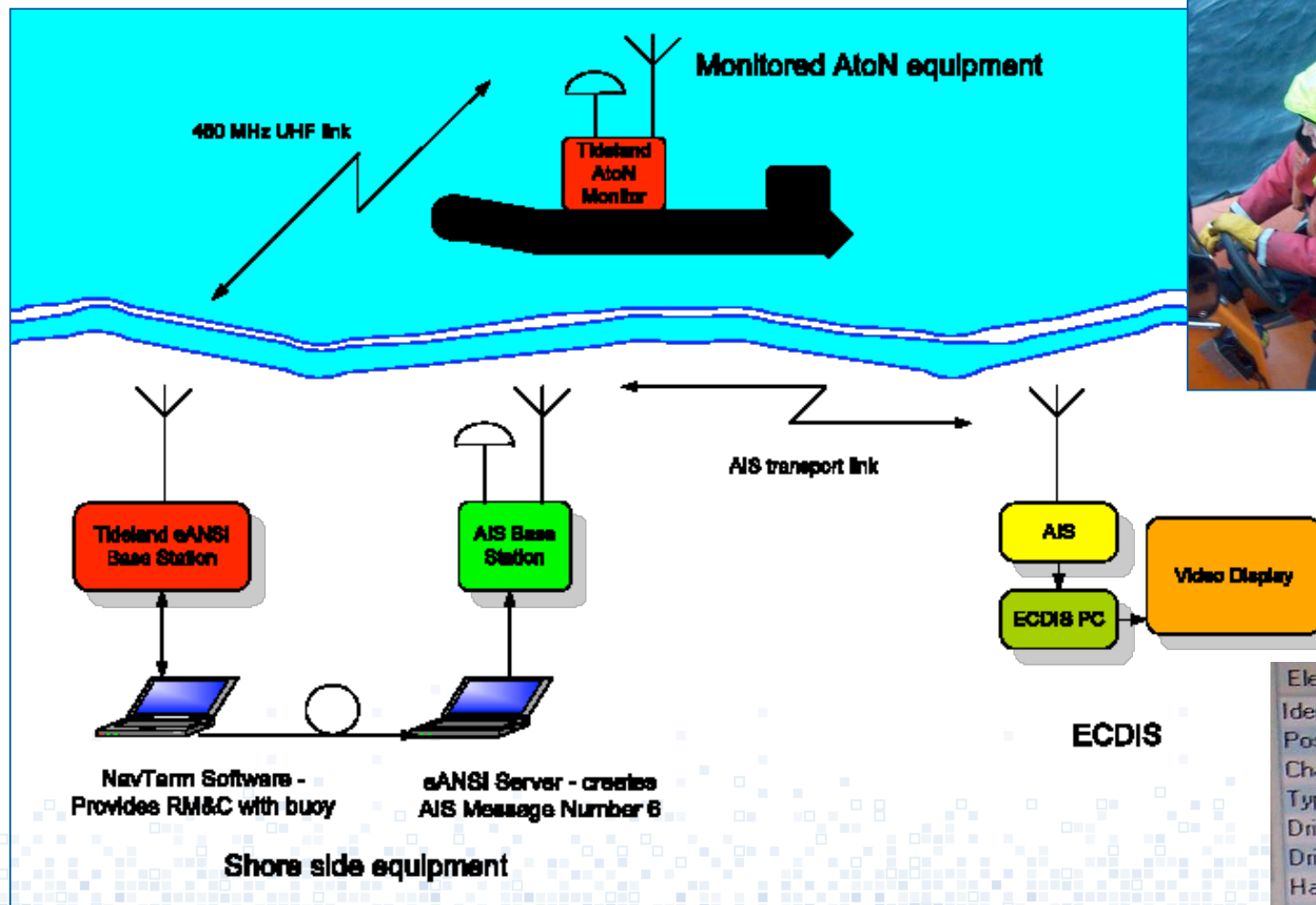
The demonstration focused on the generation, transmission and display of defined e-ANSI events.

Message Type	Description	Contents
1	AtoN drifting off station	ID, Charted Position, Current Position, Time of last transmission, Drift Speed and Drift Bearing
2	A new or uncharted hazard	Current Position, Nature of Hazard and Time of Occurrence
3	AtoN malfunction	ID, Charted Position, Nature of Hazard and Time of Occurrence
4	A message to cancel a message 1-3	Transmit time, Message type to cancel
5	Communication check or "heartbeat" message	Transmit time

E-ANSI proposed architecture



E-ANSI Demonstration



Element	Value
Identity	Boat
Position	56°24.673 N, 005°28.877 W
Charted Pos.	56°24.683 N, 005°28.868 W
Type	1
Drift Bearing	Unavailable
Drift Speed	Unavailable
Hazard/Failure	

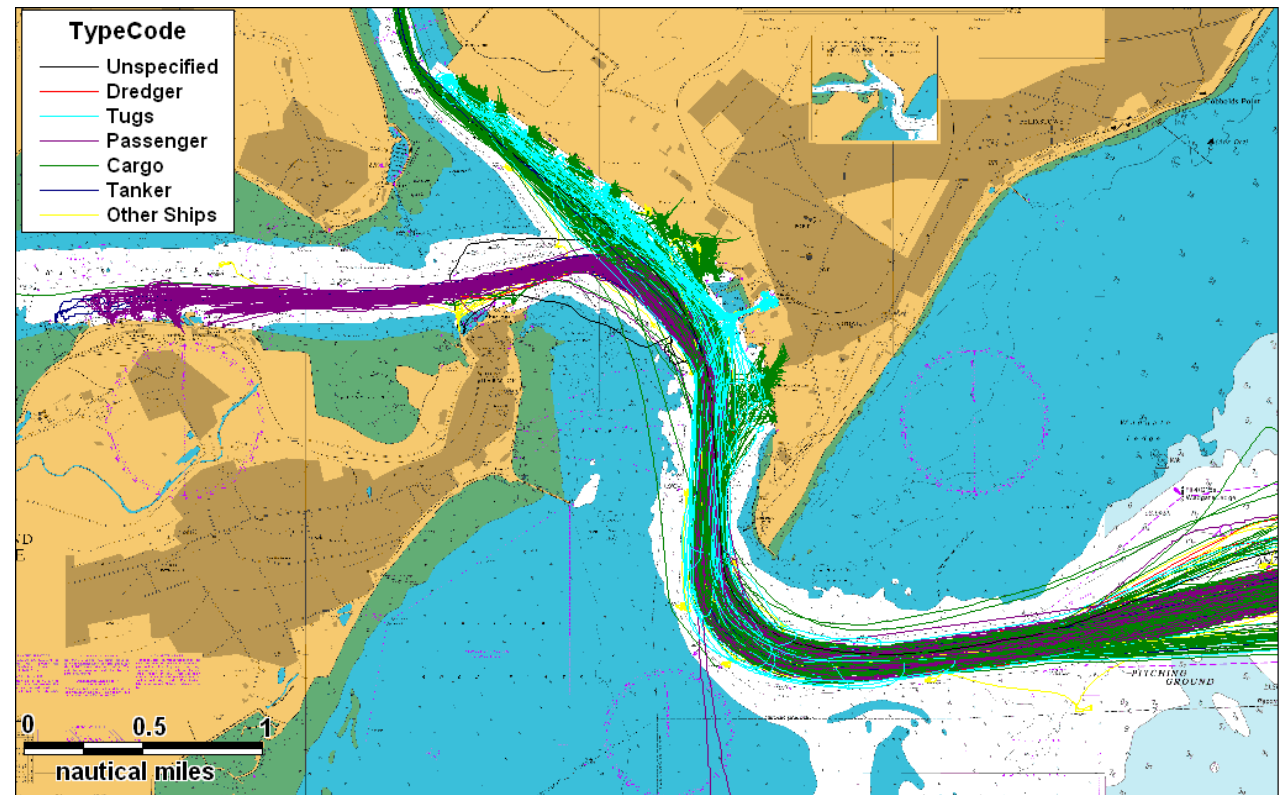
Traffic Analysis

AIS also enables the GLAs to investigate traffic routes.

This can be used to:

- Identify traffic routes
- Investigate traffic type
- Investigate the impact of offshore structures

Ultimately used to ensure the right AtoN is positioned in the right place.



AIS tracks from vessels entering Harwich and Felixstowe ports recorded over 9 days during September 2005

Conclusions

AIS is a powerful system in its own right, but is very versatile.

AIS enables the GLAs to provide:

- Virtual AtoNs.
- Synthetic AtoN
- AtoN AIS

AIS can provide an important role in e-ANSI

AIS can provide vessel routes.

AIS as an AtoN provides additional tools through which the GLAs can continue to ensure the safety of all mariners.



Thank you

The Authors' are grateful for the support provided by the Northern Lighthouse Board during both demonstrations. We would also like to acknowledge the efforts of the MARUSE consortium, Tideland and Gatehouse in the completion of this work.



Image source: Dr. C. Dixon

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