The General Lighthouse Authorities of the United Kingdom and Ireland

e-Navigation & ERNP

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The General Lighthouse Authorities

- The three GLAs have the Statutory Responsibility for the provision of marine Aids to Navigation around the British Isles
  - The Corporation of Trinity House (founded in 1514) is responsible for England, Wales, the Channel Islands and adjacent waters
  - The Northern Lighthouse Board (founded in 1786) is responsible for Scotland and the Isle of Man
  - The Commissioners of Irish Lights (founded in 1867) is responsible for Ireland
- The three GLAs are funded by Light Dues paid by shipping that are paid into a central General Lighthouse Fund
  - The GLF is administered by the UK Department for Transport
  - The Light Dues have decreased significantly in real-terms during the last decade as a result of a drive to be more cost-effective
- The Tri-GLA Research & Development Team has been established as a central resource to support R&D in a number of areas including Radionavigation and Lights

e-Navigation is intended to make safe navigation easier and more cost effective

- e-Navigation is a UK DfT concept, supported by the GLAs. It is the transmission, manipulation and display of navigational information in electronic formats to support port-to-port operations
- It is needed
  - to minimise navigational errors, incidents and accidents;
  - to protect people, the marine environment and resources;
  - to improve security;
  - to reduce costs for shipping and coastal states; and
  - to deliver benefits for the commercial shipping industry – e.g. one man bridge, stable infrastructure

e-Navigation comprises a number of structural components

- Accurate, comprehensive and up-to-date electronic navigation charts
- Accurate and reliable electronic positioning signals with fail-safe redundancy based on the combined use of satellite and terrestrial radionavigation services
- Information on vessel route, bearing, manoeuvring parameters and other status items in electronic format
- Transmission of positional and navigational information ship to shore, shore to ship and ship to ship - AIS
- Clear, integrated display of above information on board ship and ashore - ECDIS
- Information prioritisation and alert capability in risk situations on ship and ashore

The future e-Navigation environment will rely heavily on GNSS for both its navigation and surveillance functions

Phase	Technology	
	Navigation	**Surveillance**
Port/harbour inc. docking	DGNSS, RTK GNSS Loran	VTS – GNSS with VHF (inc AIS)
Coastal	Radiobeacon DGNSS SBAS Racons AIS as an AtoN Loran	Automatic Identification Systems (AIS) – GNSS with VHF Radar
Oceanic	GNSS SBAS Loran in some areas	Long Range Identification & Tracking – GNSS integrated with satcomms

Potential GNSS single point of failure - there are important availability/safety issues to be investigated – GLAs doing that through various projects

A physical AtoN backbone will always be needed to provide a reversionary capability

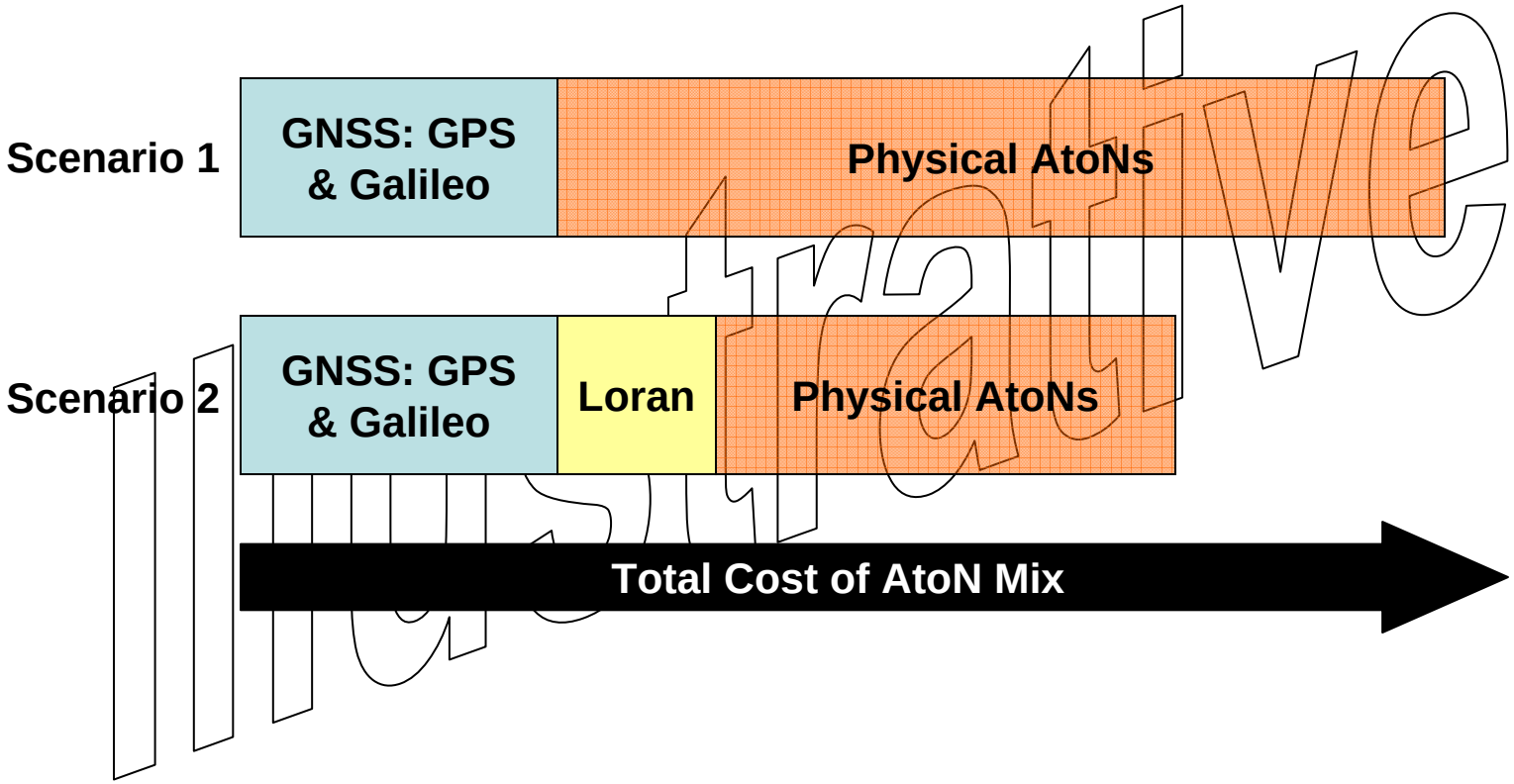
- GNSS is the core navigation system
- GNSS vulnerabilities have been well-documented:
  - Volpe Report on GPS Vulnerability (2001)
  - Helios Technology, European Union Radionavigation Plan
  - And others
- The likelihood of jamming or interference may rise
  - terrorism
  - GNSS used for road-user charging
- UK policy stated in the GLA's document "2020 The Vision"
  - Recognises this vulnerability and realises the need for a diverse and integrated mix of radionavigation and physical AtoNs

Safe, but cost-effective too…

- There is an ongoing drive for AtoN service providers to deliver higher levels of safety to support new, more demanding operations while becoming increasingly cost-effective
- GNSS is vulnerable and a physical AtoN backbone will always be needed to provide a reversionary capability
- At the same time, the continued and increasing reliance on GNSS means that mariners are likely to lose traditional skills that allow them to use physical AtoNs
- Consequently, in the future, reverting directly from GNSS to physical AtoNs may not be as safe as it is today

Loran will allow e-Navigation operations to be maintained when GNSS services are lost.

The hypothesis: a progressive reversionary process from GNSS to Loran to physical AtoNs is more cost-effective *and safer* than a similar reversionary process from GNSS to physical AtoNs



Important future cost drivers are likely to include fuel and manpower for the provision of physical AtoNs

Loran is needed to realise the full benefits of e-Navigation and to deliver the radionavigation dividend to users

- The *radionavigation dividend* - cost-savings that result from the introduction of radionavigation services and their take-up in the maritime sector
- Maximising the radionavigation dividend will rely on
  - The availability of radionavigation services that complement GNSS
  - Take-up of e-Navigation across the fleet

Managing Change

- In a safety-critical environment we want to respond to, and to manage, expected change to allow AtoN service providers and users to plan their long-term investment
  - changing operations including high-speed and larger vessels and new traffic patterns
  - new technology including new radionavigation systems, signals and services
  - the changing environment including coastal infrastructure and climate
  - the evolving user-base with a wide range of competencies
  - the changing business environment
- Our emphasis is on delivering a cost-effective AtoN mix to support e-Navigation with due regard to safety and risk

The Way Ahead for e-Navigation

- The GLAs will continue to assess how best to integrate radionavigation services into the AtoN mix
  - to ensure that technology development is driven operationally by user requirements
  - to plan actively for significant change in the radionavigation domain (new systems, signals and services)
  - to manage the long-term investment process for the GLAs and users
- In parallel the GLAs will continue to work with colleagues in international fora to pursue global interoperability and harmonisation

ERNP - Overview

- EC Director General for Energy and Transport (DG-TREN) awarded a contract to Helios Technology to contribute to its development with the following team
  - Telematica – Germany
  - GLAs – UK and Ireland
  - INECO – Spain
  - University of Leiden - Netherlands
- Required to concentrate EU-level resources on core radionavigation systems to promote trans-European and global safe multi-modal transportation and mission-critical operations.
- Started in January 2004 concluded October 2004 – involved ERNP Expert Group – technical experts from EU Member States and Eurocontrol

ERNP - Benefits

- Improved harmonisation of European radionavigation services
- Rationalisation of radionavigation infrastructure
- Determination of system mix that increases safety and security, and reduces the dependence on GPS
- Promotion of multi-modal systems to enable cost efficient solutions
- Increased stability to allow industry to plan further investment

ERNP – Main Outputs

- Document containing recommendations to the European Commission – “Recommendations toward the development of a European Union Radio-Navigation Plan (ERNP)”
- Document describing radionavigation systems and applications – “European Union Radio-Navigation Services (ERNS)”

ERNP – Recommendations for Loran

- The EU should work with member and associated States and appropriate international organisations to
  - investigate the European-wide provision of Loran/Eurofix services in order to secure both transport and wider socio-economic policy benefits delivered by Loran/Eurofix
  - harmonise Loran/Eurofix standards
  - support the development of multi-modal receivers to ensure service take-up
  - recommend a way forward for providing harmonised European DGNSS land-cover based on GPS and Galileo

- The EU should work with Russian Federation Chayka authorities to understand their plans for the service and the potential for interoperability with Loran/Eurofix

ERNP – Progress?

- At the final presentation, EC proposed to take the ERNP study, and publish an initial ERNP following further consultation with member states
- Little progress appears to have been made in 2005
  - No information on DG-TREN website
- The part of EC DG-TREN that commissioned the ERNP study is believed to be preoccupied with the Galileo concession process
  - Negotiations over Galileo concession contract should be concluded in Q4 2005 or Q1 2006
- Trinity House is working with other marine aids to navigation service providers to encourage the EC to push ahead with the recommendations of the ERNP