

e-Navigation, The Continuous Development of the Concept of the Future

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IMO Definition of e-Navigation

“ ... the harmonized collection, integration, exchange, presentation and analysis of marine information on-board and ashore by electronic means

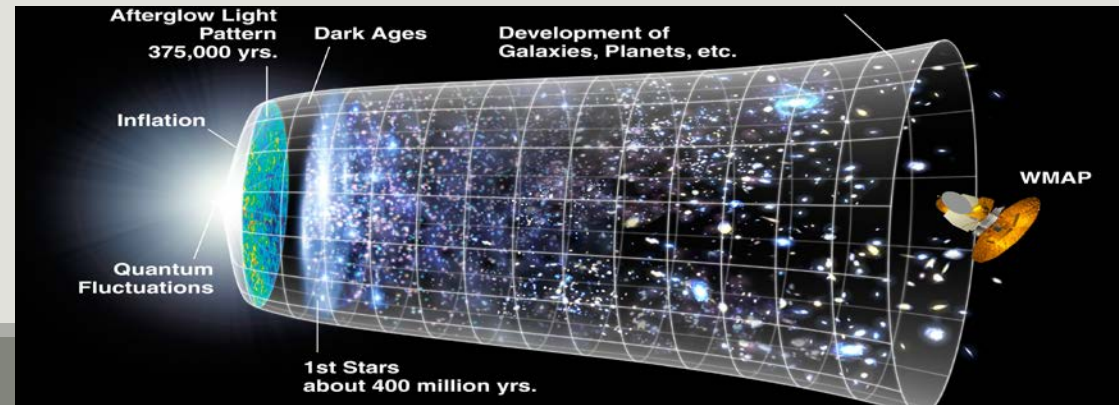
to enhance berth to berth navigation and related services ...

for

safety and security at sea and protection of the marine environment”

Before e-Navigation

- Modern electronics technology – 1960s onward
 - Integrated circuits, digital techniques, and later, software-defined radios
- Satellite positioning and electronic display – 1995 onward
 - First GPS receivers, plotting on paper charts
 - First ENC's arrive, Own ship now visible on electronic display
- AIS technology – 2000s onward
 - Other ships become visible on ENC - with name, call-sign, speed, etc.
 - **AIS + GPS + ENC gave the officer on the bridge and the VTS officer ashore a clear situation awareness for the first time**
- Integrated services external to the ship
 - AIS Aids-to-Navigation
 - AIS weather and tide information services
 - Modern Vessel Traffic Services ...



The Beginning of e-Navigation

2005-02-21, Brian Wadsworth, UK Department of Transport

e-Navigation?

- The transmission, manipulation, and display of navigational information in electronic format

Why?

- To minimise navigational errors, incidents and accidents, to improve security and to **reduce costs** for shipping and coastal states

How?

- Using satellite positioning signals, underpinned by fail-safe supplementary positioning signals (eg. Loran C), displayed in an intelligible and comprehensively integrated format (ECDIS) on board ship and replicated on shore with **shore-based intervention capability ...**

IMO Maritime Safety Committee

2005-12-19

Submission by Japan, Marshall Islands, the Netherlands, Norway, Singapore, the United Kingdom, and the United States

Key structural components

- Electronic navigational charts
- Accurate and reliable electronic positioning
 - GNSS, differential systems, Loran C, defaulting receivers, inertial
- Ship data and route data
- Information exchange Ship-Shore and Ship-Ship
- Accurate, clear, user-friendly bridge display
- Reliable transmission of MSI and distress alerts
 - Envisaged a new GMDSS using modern communications

(IALA started its work on e-Navigation in September 2006) ...



On the Bridge



Vessel Traffic Services



Status of e-Navigation Today

Three areas of activity

- IMO – Strategic Implementation Plan
- National and regional initiatives
- International organisations

Regional initiatives in the North Sea, Baltic, Korea, etc. will develop in parallel with the IMO work

International organisations will support the IMO work

- IALA Examples:
- Test bed comparison and evaluation
- Communications
- Data structure ...

Global Status - IMO

e-Navigation Correspondence Group

- Leader – Norway
- Completed its draft Strategic Implementation Plan last month

Criteria

- Seamless transfer of data between various items of equipment on board
- Seamless information transfer – ship-shore, shore-ship, ship-ship, shore-shore

“Solutions”

- User-friendly bridge design
- Automatic reporting
- Reliability and integrity of bridge equipment
- Presentation displays
- VTS services ...



National Initiatives

Australia – Torres Strait

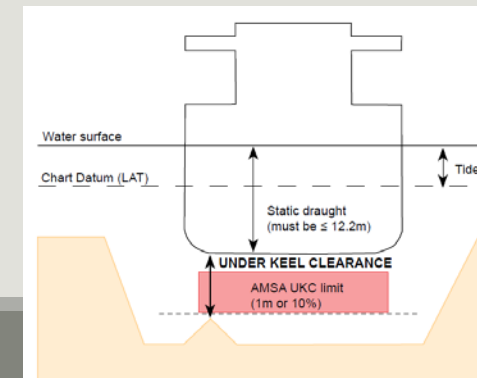
- Under Keel Clearance Management System, December 2011, web-based

Canada – St Lawrence Seaway

- Information broadcast by AIS
- Wind and water level data
- Draft management
- Lock schedules

USA – Army Corps of Engineers, Inland rivers

- Information broadcast by AIS
- River currents ...



National Initiatives

Korea – PNT

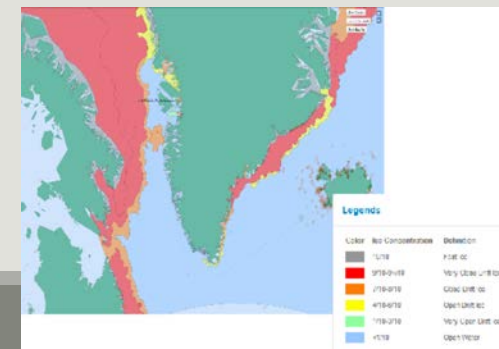
- All coastal waters covered by Loran-C
- Planning eLoran implementation, land and sea
- “Smart Navigation” intended to include **small craft, fishing and pleasure**
- Reported to have allocated the equivalent of \$200m for e-Navigation

Finland

- Tanker Safety Service

Denmark – ArcticWeb

- Web-based ice reports, vessel tracking, nearest other ships ...



Regional Initiatives

ACCSEAS

EU – Monalisa project

- Dynamic route exchange
- Shore-based intervention capability
- “Maritime Cloud”
- MICE – Arctic

MOU – Korea, Denmark, Sweden

- Test bed cooperation

FERNS – Far East Radio Navigation Service

- Resilient PNT via Loran-C and eLoran
- China, Korea, Russia ...



The Work of IALA in e-Navigation

Strategic Plan to 2026

- With 2014 - 2018 Priorities

ENAV Committee

- Communications for e-Navigation including VDES
- Data Modelling
- Maritime Service Portfolios

VTS Committee

- Technical and operational standards
- Inter-VTS data exchange
- Standardised communications

IALANET ...



The Outcome

Reduced workload on the bridge – auto reporting, improved presentation, situation awareness, services from shore

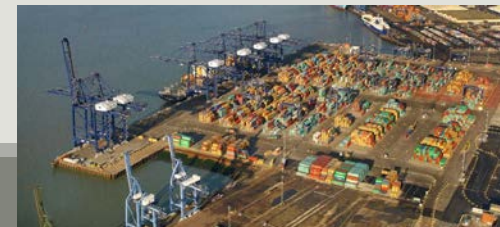
Dynamic route exchange leading to improved safety, and fuel savings

Accurate arrival time information ashore

Better access to ports in congested sea areas like the North Sea

Summary – Improved coordination and economics of the whole transport logistics chain

Later, could route or access preference be given to vessels with a specific equipment fit? ...



Benefits

Safety at sea and protection of the environment

- North Sea
- Arctic

Reduced bridge workload, human-centred design and displays

Economic benefits for the EU area

Transport chain efficiency and cost reductions ...



Challenges

Harmonisation of information exchange

- Communications
- Data and message structure
- Maritime cloud

Acceptance of shore-based intervention

Focus on the total transport logistics chain

Evaluation of test bed outcomes

Application of the conclusions to global, or at first, regional harmonisation

- ACCSEAS, Monalisa, and others ...



Thank you

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