

# e-Navigation for ENG-ineers

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IALA ENG5 Committee Meeting

October 2016

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# e-Navigation is not...

- ...just a box fitted to a vessel.
- ...the internet for ships.
- ...for producing autonomous or semi-autonomous vessels.
- ...a complete replacement for existing navigation aids.
- ...to make the mariner's life more difficult!



# What's the problem?

- Maritime accidents caused by human error
- Information overload
- Potential for decreased spatial and situational awareness
- More, bigger vessels
- More challenging seascape
- Need for improved efficiency and environmental protection



# e-Navigation: The IMO Definition

*e-Navigation is the **harmonised***

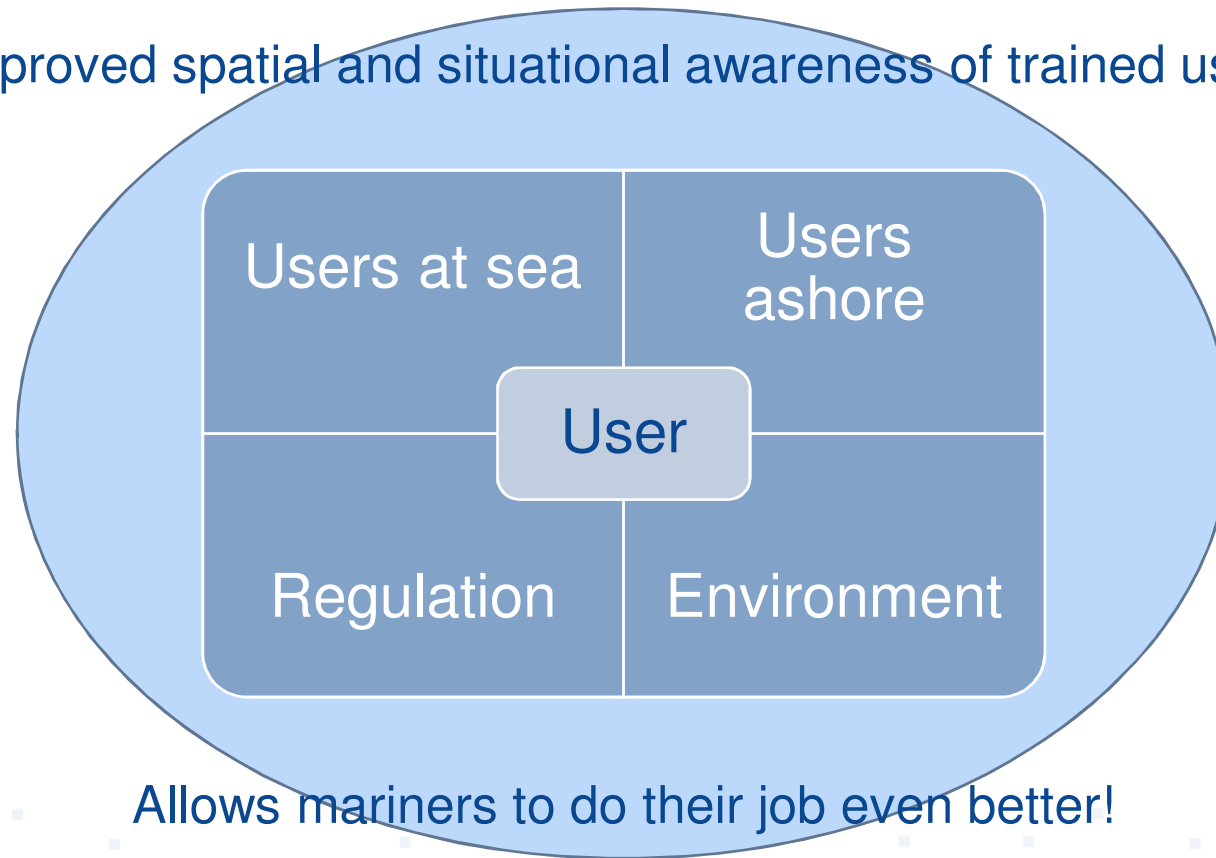
- *collection,*
- *integration,*
- *exchange,*
- *presentation and*
- *analysis*

*of maritime 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.***

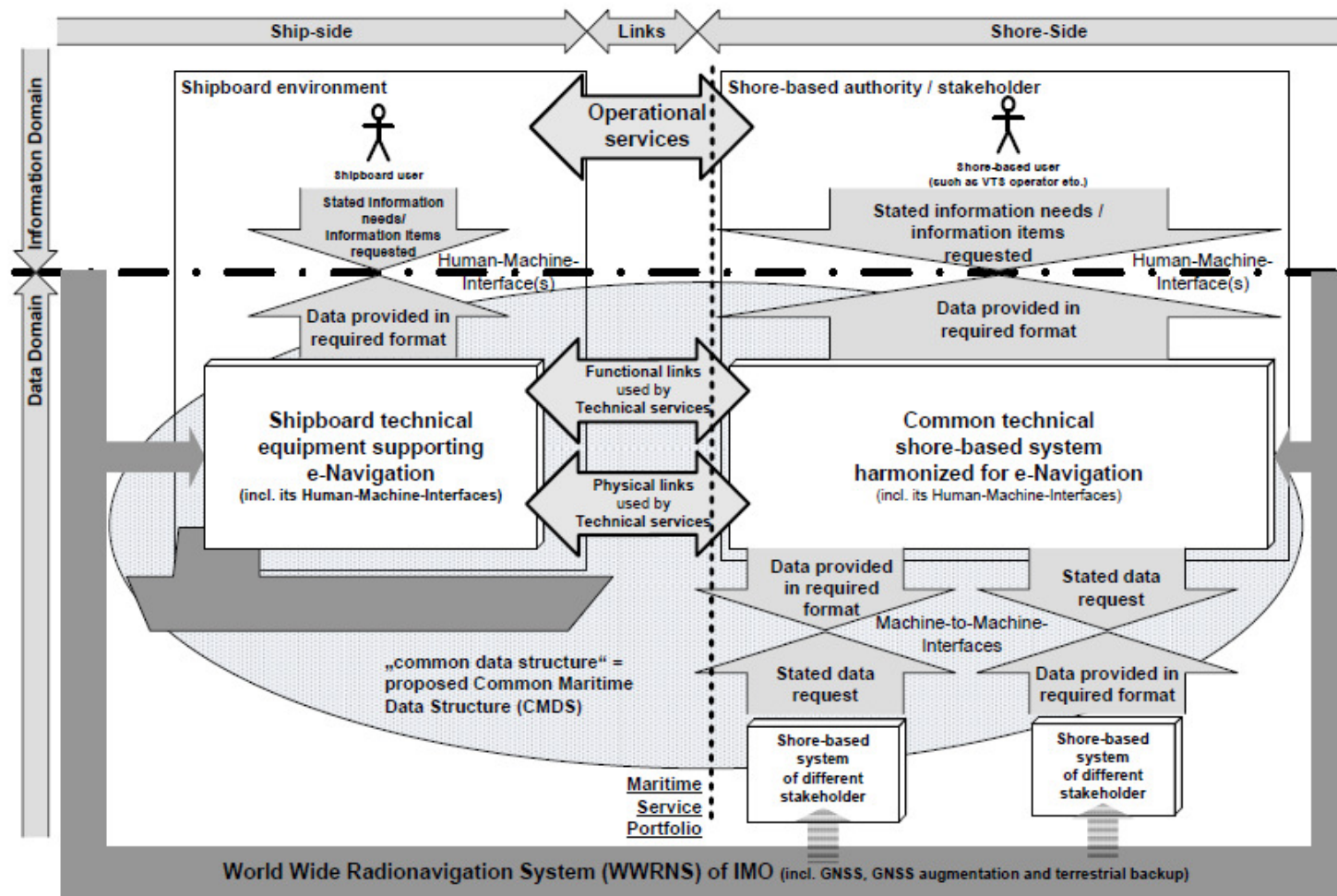
# What it means

Improved spatial and situational awareness of trained users



Allows mariners to do their job even better!

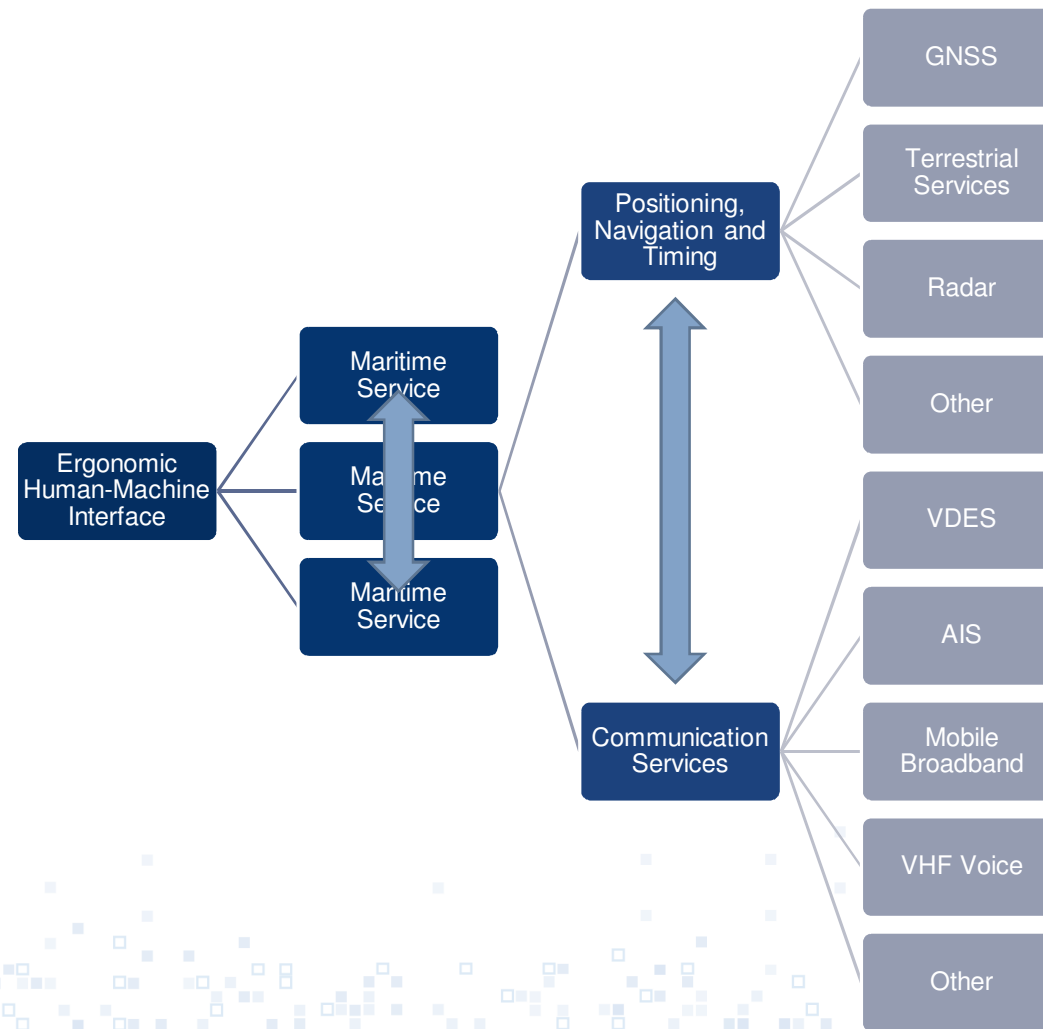
# e-Navigation in a nutshell...



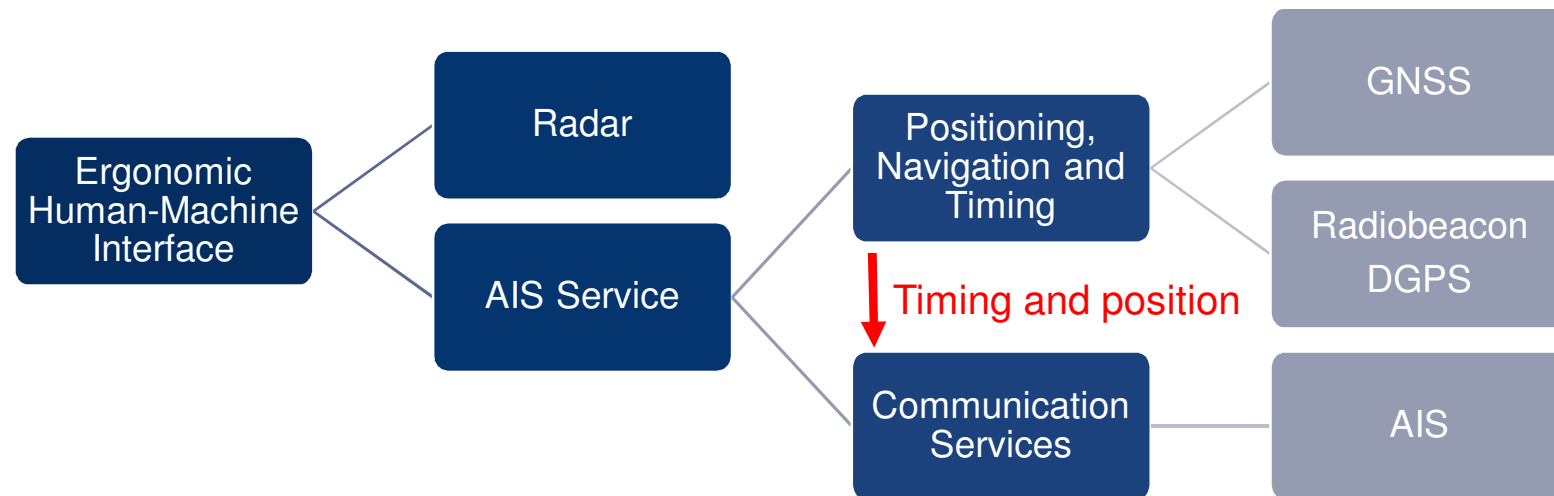
Note: There are operational and technical interactions between different shipboard environments. These are not shown for simplicity's sake in this figure.

Source: IMO

# Simplified elements of e-Navigation



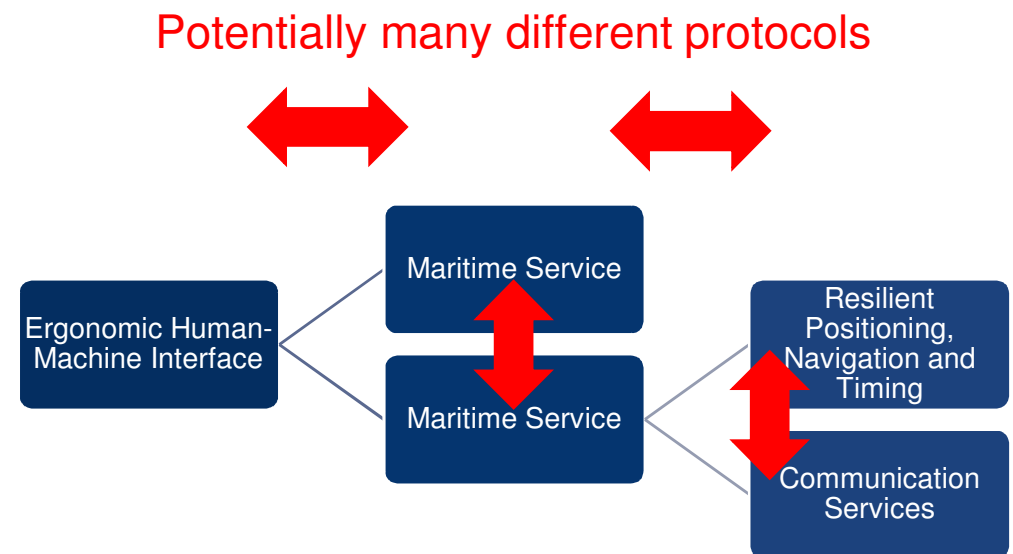
# Simplified elements of e-Navigation: An Example





# Harmonising the elements

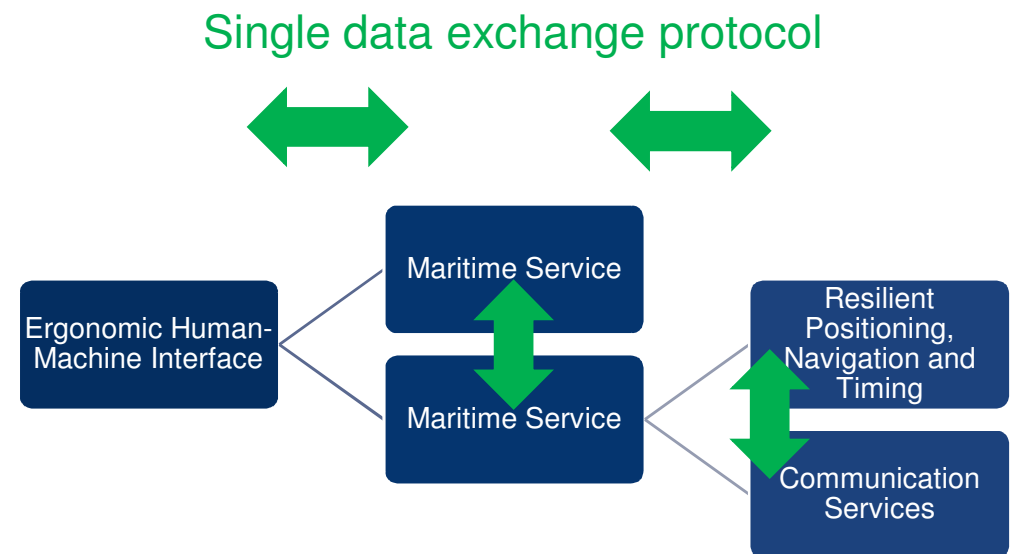
- The challenge!!
- Many existing services
  - Radar
  - VHF Voice
  - AIS, and many others...
- Many potential services
  - Under-keel clearance
  - MSI or Notice to Mariners
  - SAR Co-ordination
  - Ice monitoring services



Could easily lead to poor integration,  
no harmonisation and bad HMI

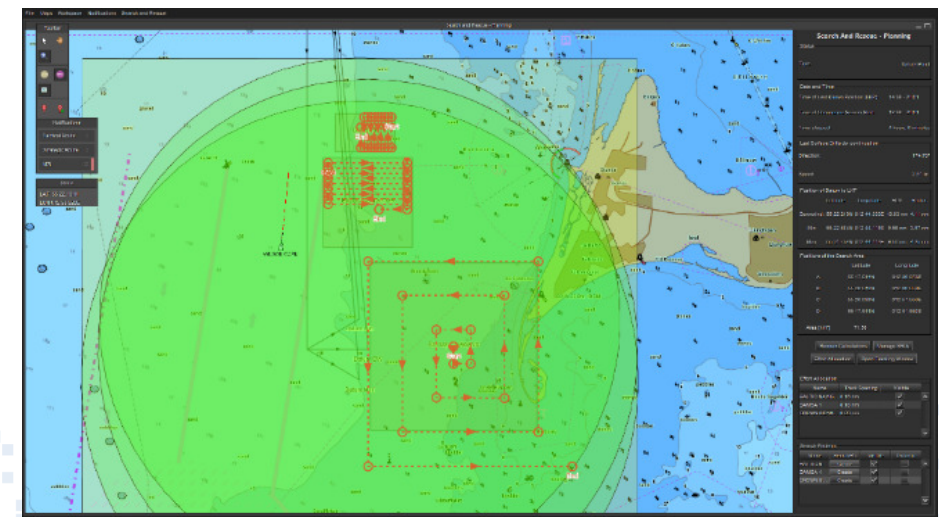
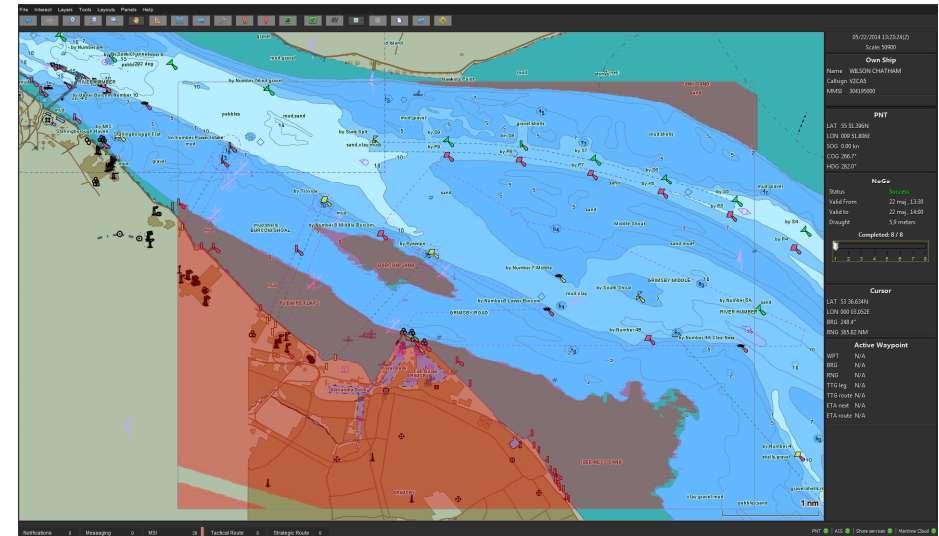
# Common Maritime Data Structure

- Common language between the elements of e-Navigation
- IHO S-100 Data Exchange Format
  - Defines a standard protocol for data exchange and portrayal
  - Harmonises the implementation of maritime services
- Complex design, uses UML principles

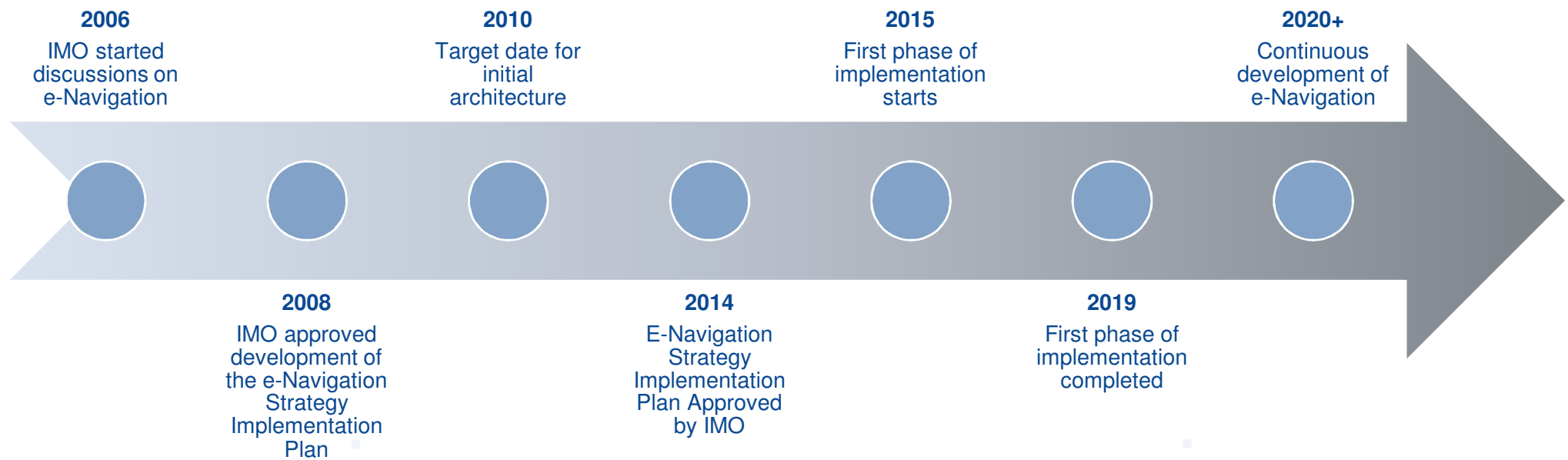


# Maritime Service Portfolio (MSP)

- Collection of maritime operational and technical services
- Maritime services provided depending on the requirements of the area
  - E.g. Under-keel clearance for large tidal range port
- “Maritime Cloud” is a registry of MSPs, which also provides authentication and security features



# Timeframe for e-Navigation



# Who is doing what?

## ■ IMO

- Leading the e-Navigation strategic development
  - Identified the potential users of e-Navigation and their **needs**
  - Identified solutions, including a subset higher priority solutions
  - Identified tasks to be completed in order to implement the solutions
- Mainly focusing on shipborne elements of e-Navigation
- Human-centred design

## ■ IALA

- Leading the shore-side e-Navigation development
  - ENAV Committee: Resilient PNT, Communications, Harmonisation, Maritime Service Portfolios and Implementation
- Harmonising e-Navigation testbed results
  - IALA Guideline 1107 on the Reporting of Results of e-Navigation Testbeds
  - Available on the IALA website

# Who is doing what?

## ■ IHO

- Leading the development of S-100 data exchange format
- (IALA responsible for the S-200 domain, covering areas within IALA remit, e.g. Aids-to-Navigation Information, DGNSS Station Almanac)

## ■ Everyone else

- Enabling technology to achieve the goals of e-Navigation
- Testing concepts, ideas and services in e-Navigation testbeds
  - EfficienSea 2 (IALA is a partner in this EU project)
  - STM Validation
  - Arctic Web
  - Torres Straits
  - SESAME Straits

# Conclusion

- Lot of development already done...but still a long way to go!
- Many technical, regulatory, commercial and political hurdles to overcome
- e-Navigation testbeds around the world useful to try ideas with users...and to establish acceptance.



Source: ACCSEAS



# Thank you

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# What will e-Navigation look like?



ACCSEAS

Accessibility for  
Shipping, Efficiency  
Advantages and  
Sustainability

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## Accseas Demonstrations Arriving into Humber