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INNOVATING SOLUTIONS

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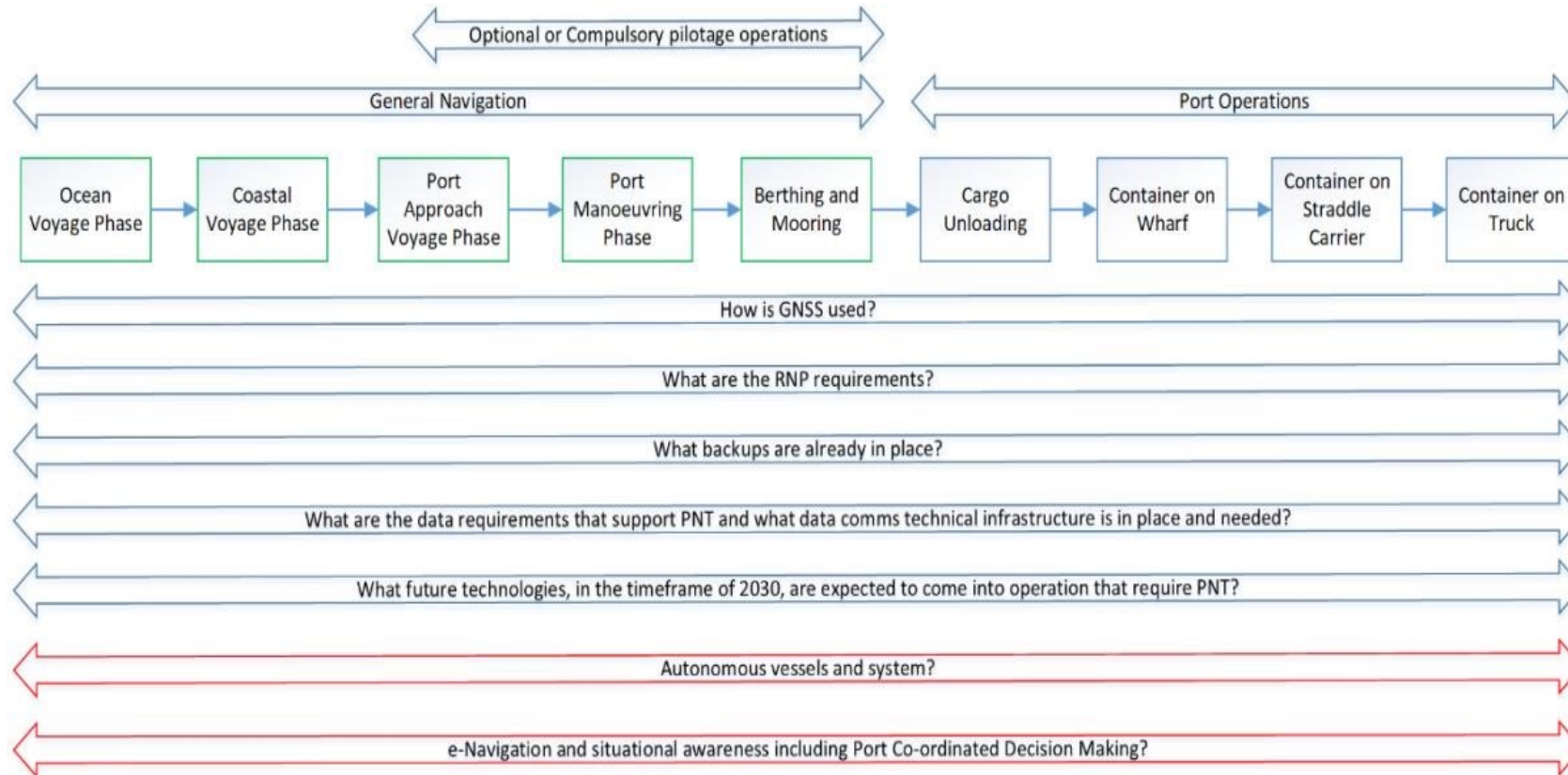
Imperial College  
London



REY

Use cases and applications  
consultation: Exploring uses of  
integrity

# MarRINav - Scenario of linked Use Cases for maritime analysis



## MarRINav

- The MarRINav Phase 1 project explored in depth maritime requirements and potential future solutions for Resilience and Integrity (R&I) of maritime PNT, offering capability to protect and augment maritime UK Critical National Infrastructure (CNI).
- Potential cross-sector benefits to national precise timing and land mobility applications were recognised.
- Specific Use Cases within a principal scenario of a container vessel approaching port, docking, offloading cargo and its transition through the port.
- Additionally, MarRINav considered the international context for shipping, the global regulatory environment and the need for solutions to be scalable and expandable to other application sectors, countries and regions.

# Has it changed?

- Mentimeter questions play back
  - Have you experienced a GNSS failure?
  - What is your source of integrity?
  - What does integrity mean to you?
  - Impact of integrity failures?
- Potential challenge
  - Have things changed?
  - Is it the 'real' issue?

## Has it changed – PNT & Data

- Evolution of use cases due to data requirements and connectivity?
- Data integrity, PNT part of a bigger picture?
- P, N, and T? Does connectivity change this?
- Which use cases should INSPIRe look at in order to:
  - Provide the maritime community with relevant thought leadership.
  - Inform the development of regulation and policy.
  - Grow support for research into PNT and Data resilience.
  - Optimise physical infrastructure for future data-enabled support of safe navigation and maritime operations.
  - Support mass data connectivity at sea.
  - Ensure SOLAS responsibilities continue to be met as efficiently as possible.

# Has it changed? EMSA Annual Overview of Marine Casualties & Incidents 2022

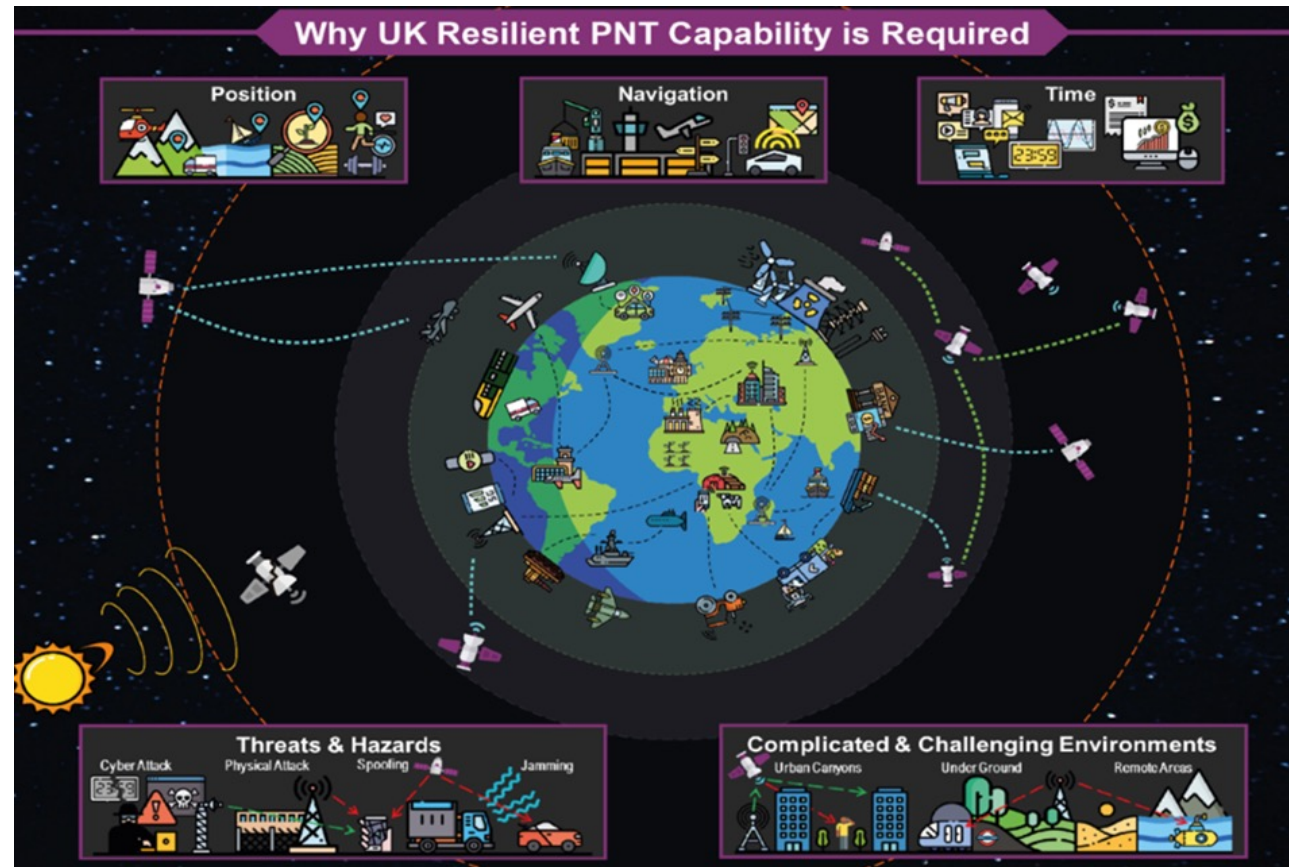
- Occurrences
  - 2,637 occurrences reported in 2021
  - 21,173 occurrences recorded in the EMCIP database 2014-2021
  - An average of 2,665 marine casualties or incidents per year 2014 – 2019
- In 2021:
  - 55% of occurrences occurred in 'Internal waters' (39.2% in Port areas) (increase on 2020)
  - 18% in 'Open sea' and 17.7% in 'Territorial sea' (decrease on 2020)
- Trends are the same in 2020 and 2021, with a 2021 increase in 'en route' and a decrease in 'Anchored or alongside'.
  - 'en route' 44.0%.
  - 'Anchored or alongside' 21%.
  - 'Departure' is "safest" at 8%

<https://emsa.europa.eu/accident-investigation-publications/annual-overview/download/7362/2713/23.html>

# PNT Integrity requirements

- What is / is there a need?
- Will it change
  - Port ops
  - Sea complexity
  - Offshore clutter
  - Insurance
  - Increased numbers of automated vessel (or more automation onboard)
- Regulatory necessity
  - Integrity through standardisation?
  - Does it enable wider regulatory evolution?
  - Will we be forced to change or are we in the driving seat?

# The Space Based Positioning, Navigation and Timing Programme (SBPP)





# What is everyone else doing?

## Our Sector



### Shipping

As Britain is an island nation, shipping and the maritime sectors are among the most ...



### Ports

Research commissioned by Maritime UK showed that in 2013 the ports sector paid £2 billion ...



### Maritime Business Services

The unparalleled tradition of excellence in legal, arbitration, insurance, P&I, shipbroking and finance makes the ...



### Engineering

UK vessels, marine systems and equipment, skills and expertise are recognised throughout the world. The ...



### Leisure Marine

The leisure marine sector is comprised mostly of SMEs - the nine largest companies represent ...

# IEEE 1952 - P1952 use case sectors



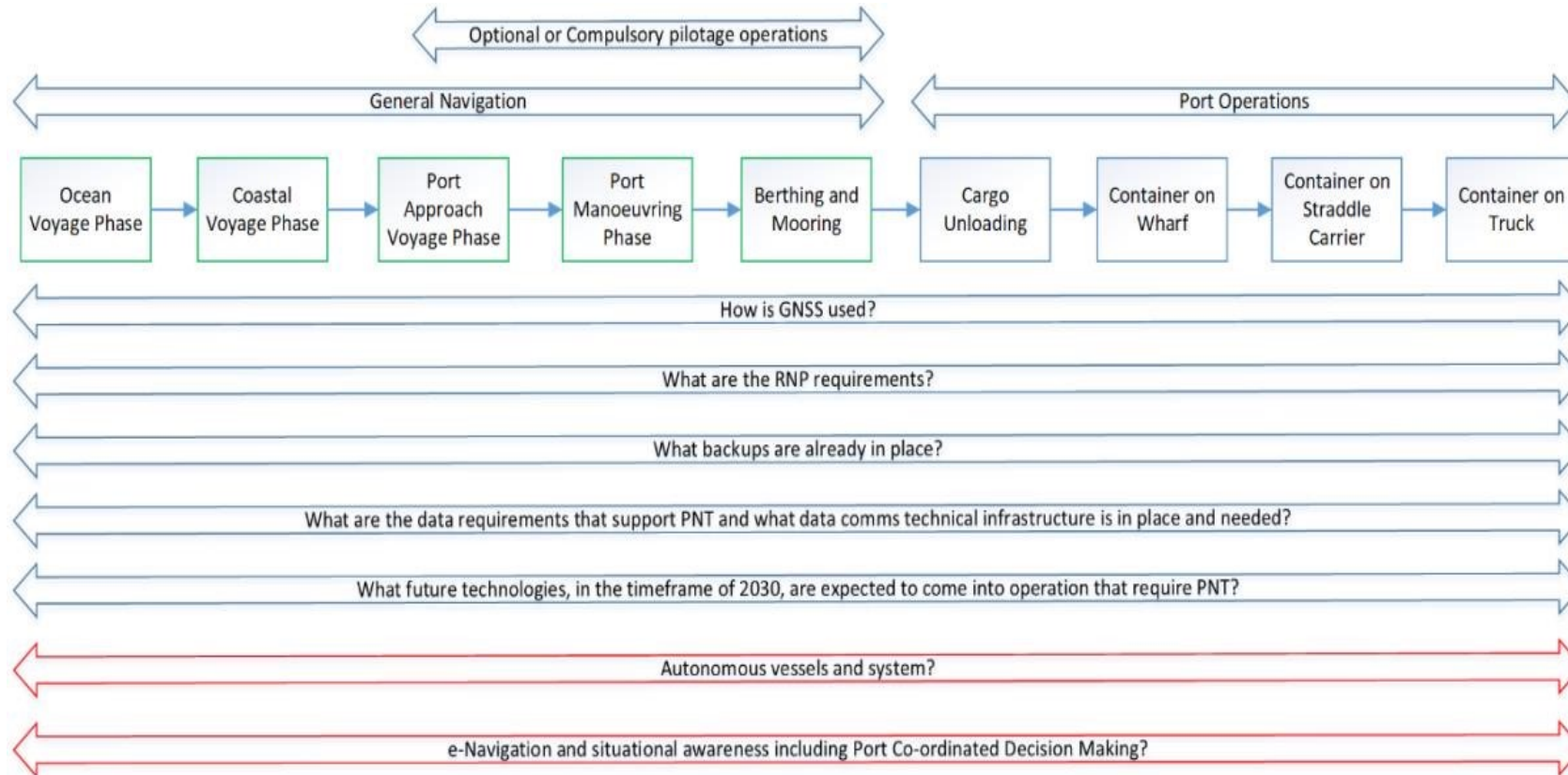
The use cases under discussion are in bright yellow with bold font

diagram thanks to David Sohn

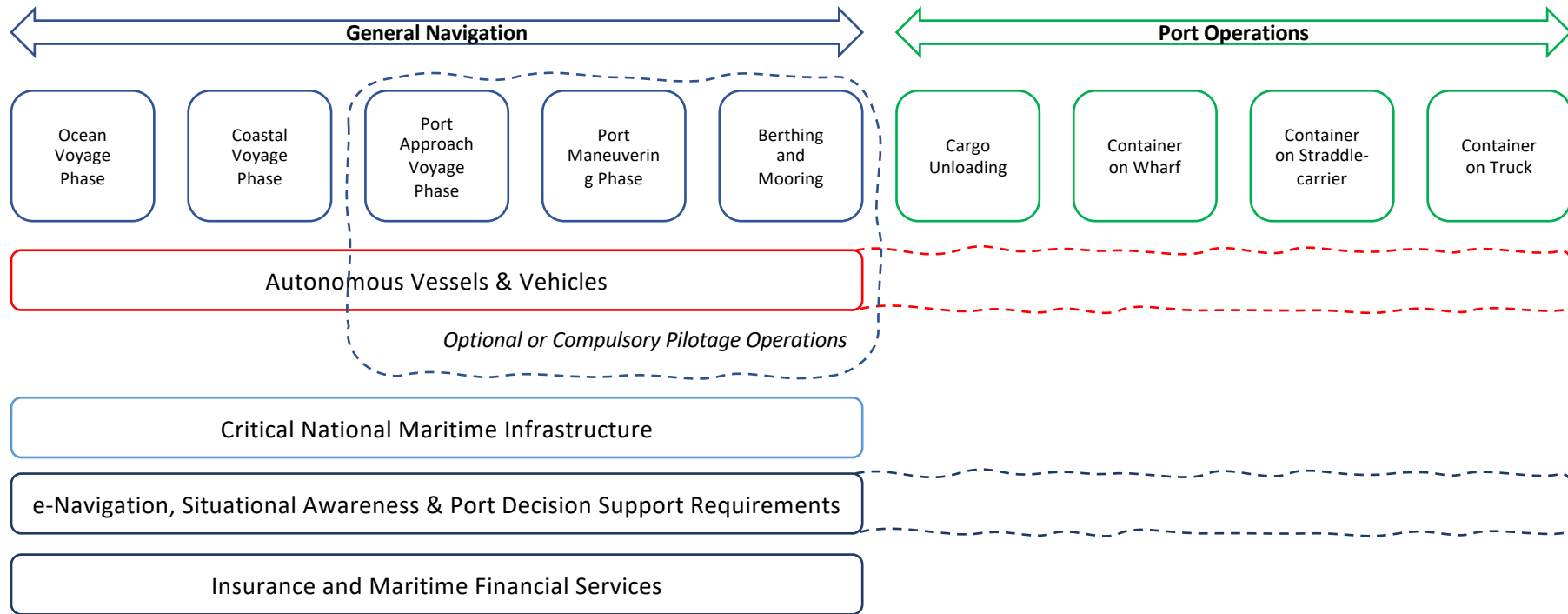
# Provisioning Position and Navigation Services

- Use Case identified by the US Department of Homeland Security in a report to Congress, that lays out potential roles for the Federal government and private industry in creating and operating contingency layers for PNT, April 2020.
- Precision Agriculture/ Construction
- Port Operations (Automated containers)
- Consumer Location Based Service
- Over the Road Navigation
- Open Water Navigation
- Open Water Navigation

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# Potential INSPIRe Use Cases



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# Potential INSPIRe Use Cases

