



SOUTH AFRICAN  
**MARITIME SAFETY  
AUTHORITY**

# **ESESA Workshop** **'the maritime environment'**

**02 & 03 Mar '11**  
**Karl Otto**

SAFE SHIPS • CLEAN SEAS

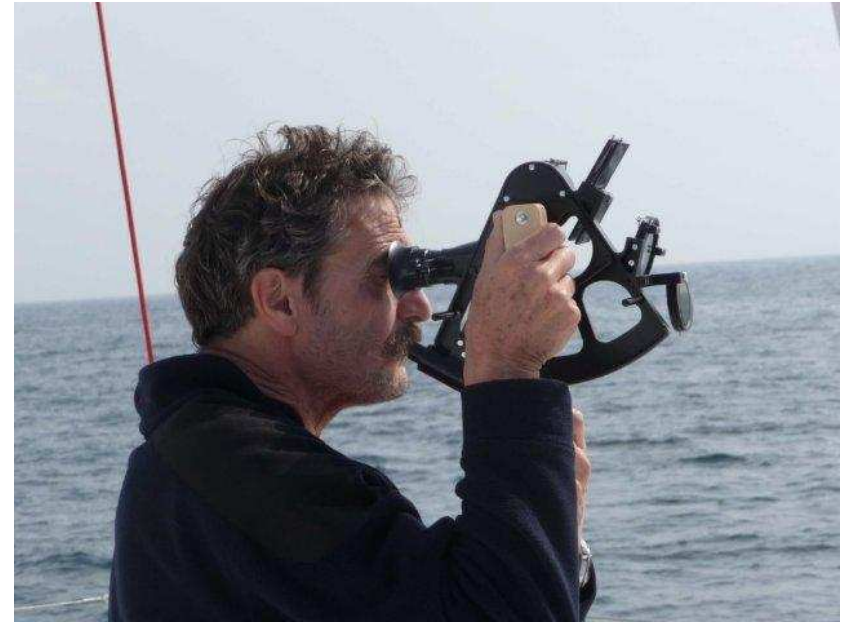


# Index

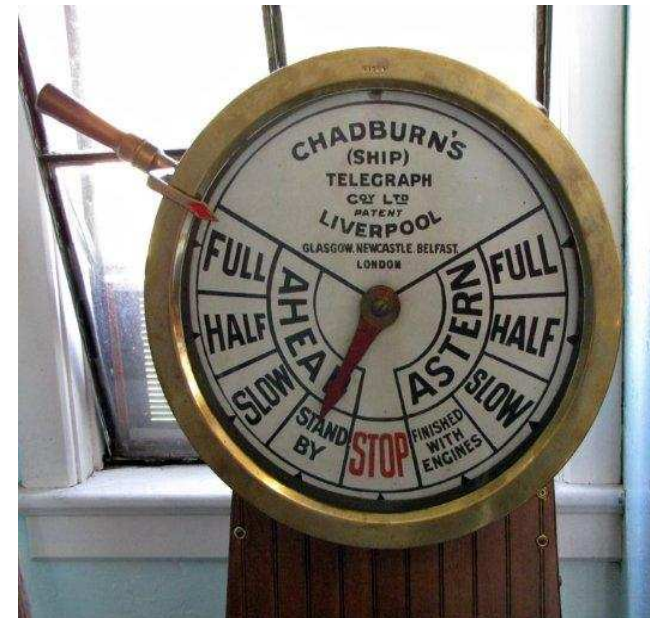
## Introduction to SAMSA's - Centre for Sea Watch and Response (CSWR)

1. Yesterday
2. Today
3. Tomorrow

# Navigation in the days of yore !!!



# Navigation in the days of yore !!!



# Navigation nowadays !!!



# GPS – boat users

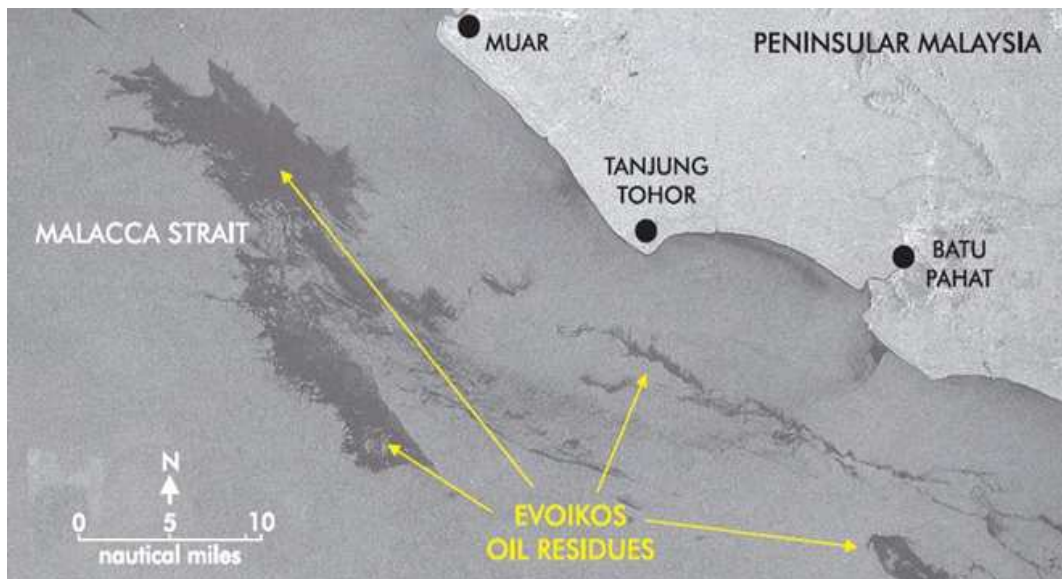
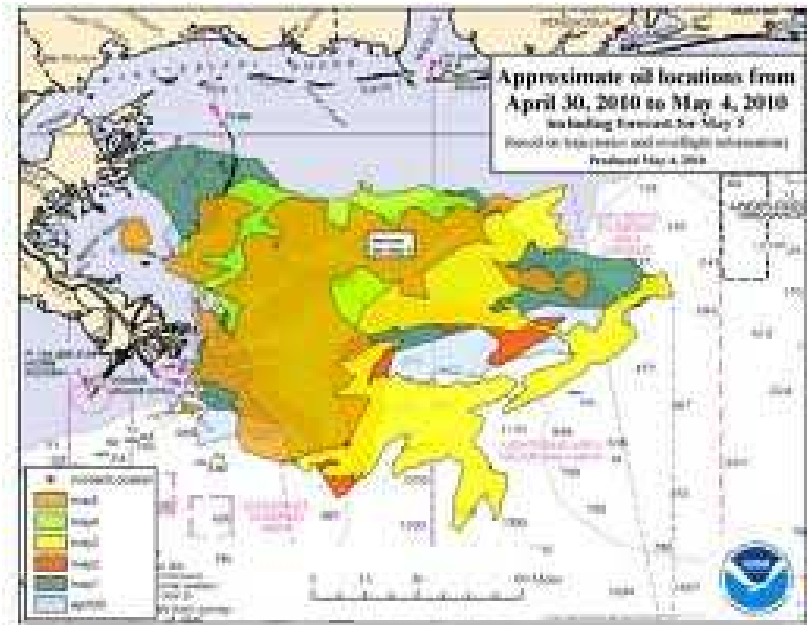




Drug  
smuggling  
activities !!!



# Oil pollution !!!





# Piracy then, ...and now !!!



# GPS usage today

GPS is integral to most applications used in the maritime world; DGPS in particular in confined areas

- Voyage planning applications aboard ships
- Accurate position-fixing for safety of navigation as well efficiency of navigation (fuel consumption)
- Used aboard sport and recreation boats on the increase
- DGPS used for correctly positioning floating Aids to Navigation (buoys)
- Vessel Traffic Services (VTS) in port systems
- Navigation in Antarctica – made easy

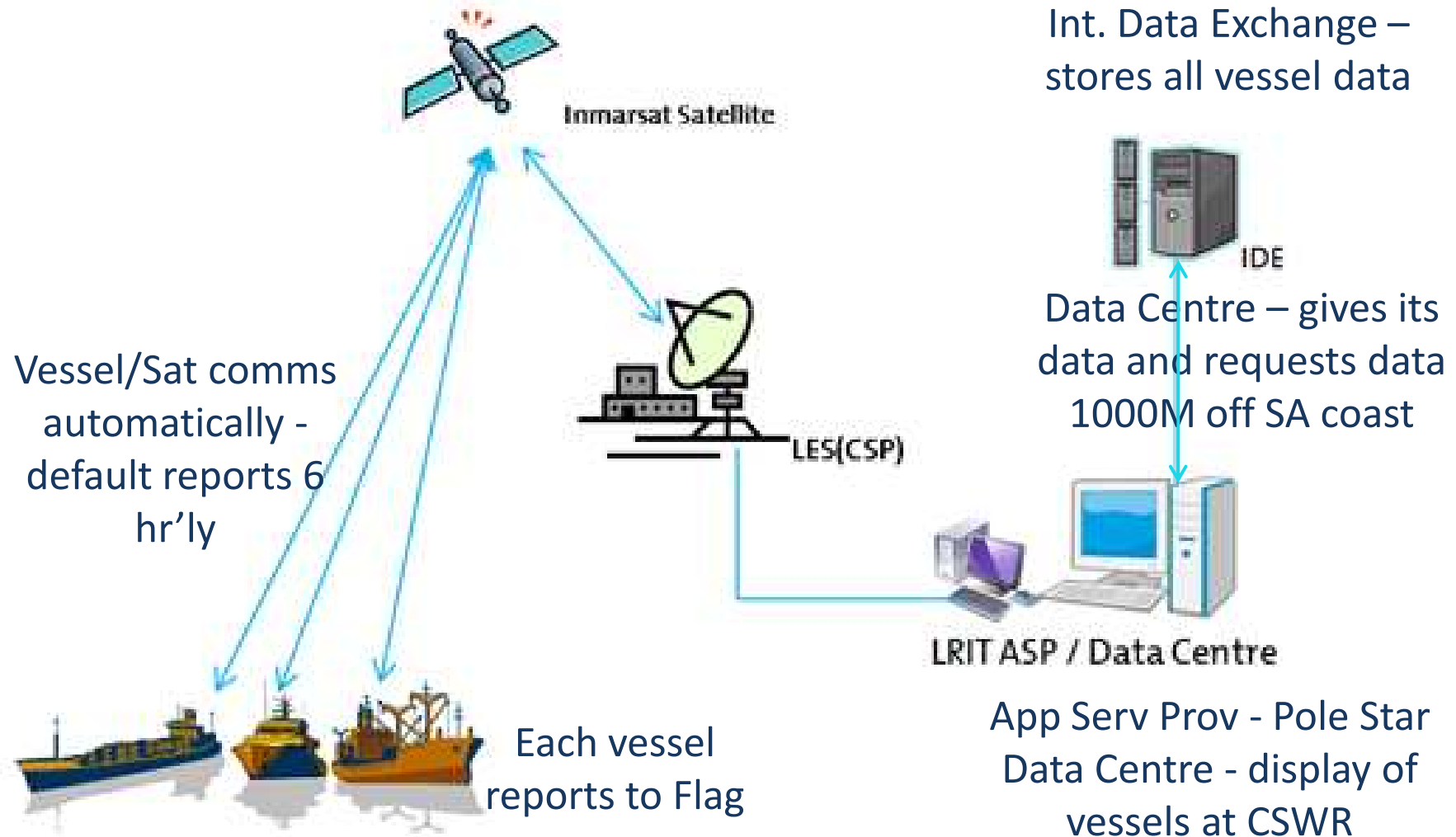
# The basics principle remains



Where are we ??

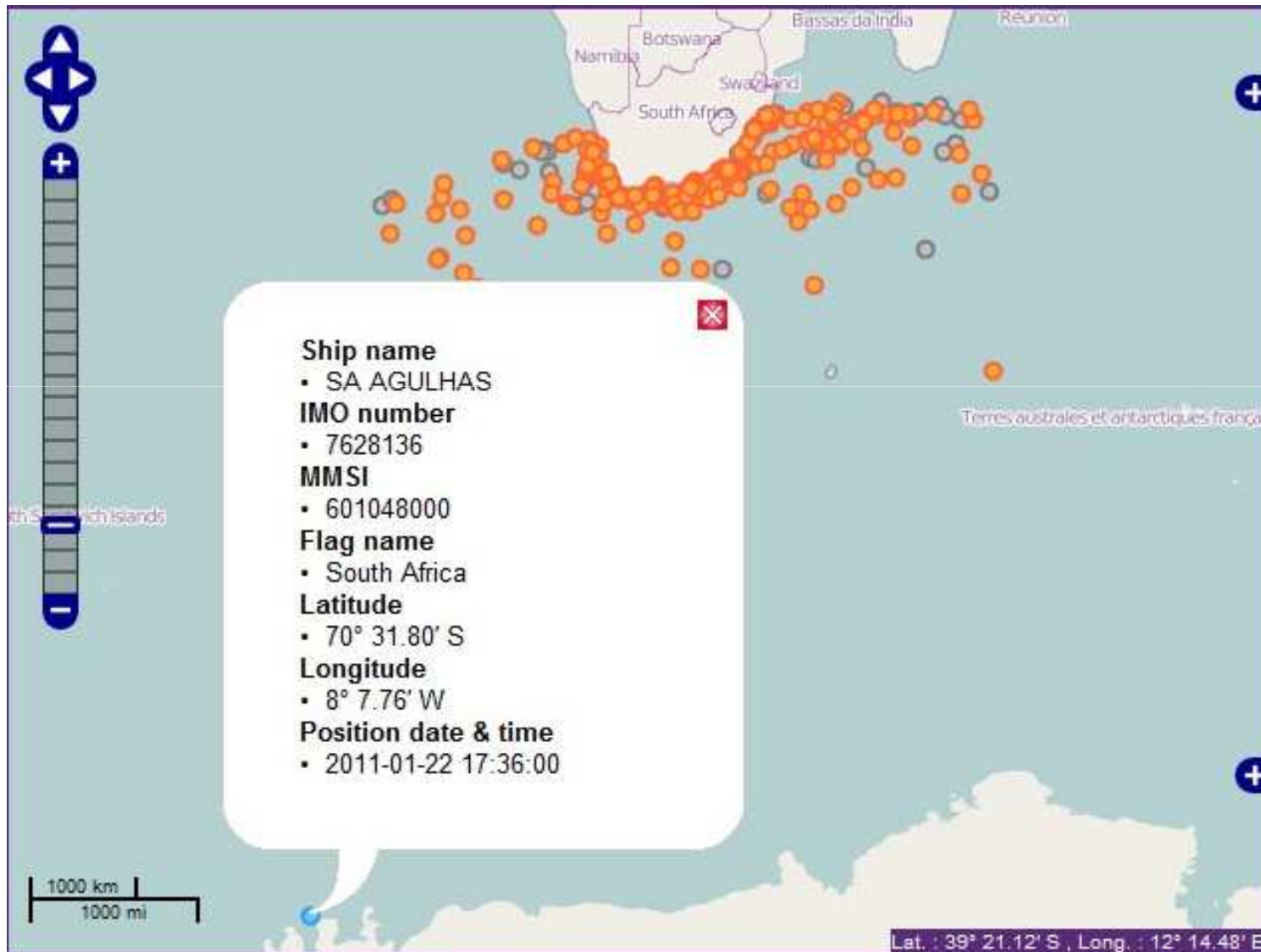
# LRIT System

## Ship – Satellite – Shore – Flag State



# LRIT data: 22 Jan 2011

## Coastal data up to 1000 miles offshore





Safmarine Oranje



## LRIT: SHIP & SATELLITE COMMS EQUIPMENT

# Satellite AIS

Another surveillance tool for Long Range Tracking:

- Satellite orbits are basically circum-polar which will ensure good coverage for vessels in the Antarctic
- Refresh rate currently 12-18hrs; fair coverage in SAR region with 2 satellites
- Refresh rate will be about 30mins when all satellites (x6) in place
- Agreement for trial in operations since June 2010
- Currently only Canada, USA & Norway have satellites with AIS technology aboard
- Norway has a ground station in Troll – Antarctica

# Satellite AIS coverage

## – coverage of SAR region – 1769 vessels

Electronic Chart - Windows Internet Explorer

http://www.samsawebchart.co.za/asm/AISLive.aspx

Electronic Chart

Total Targets: 1770, Visible Targets: 1769.

Main Menu    Target Control Centre    Data Tool

Lat: 28 43.6996 S    Lon: 27 14.9081 E    Set Origin    Range: 1500 Nm    Target Info    Map Info    Set Centre    Configuration

The map displays a dense concentration of red vessel icons in the South African Search and Rescue (SAR) region, which is bounded approximately by 20°S to 40°S latitude and 10°E to 30°E longitude. The vessels are clustered in the Indian Ocean, particularly around the east coast of South Africa and the southern tip of Africa. The map also shows the coastlines of neighboring countries including Mozambique, Zimbabwe, Botswana, and Madagascar. Major cities like Durban and Cape Town are visible. The interface includes a search bar at the top right and a detailed data panel for the selected vessel.

477534200
<b>Position Accuracy:</b> Low (>10m)
<b>Latitude:</b> 45° 27.0200' S
<b>Longitude:</b> 016° 55.5260' W
<b>IMO#:</b> 9509516
<b>Vessel Name:</b> EFFY N
<b>Callsign:</b> VRF19
<b>Speed Over Ground:</b> 14.1 knots
<b>Rate of Turn:</b> Turning Right 000%/min
<b>Course Over Ground:</b> 071.0°
<b>Heading:</b> 068°
<b>Destination:</b> DURBAN
<b>Navigational Status:</b> 0 - under way using engine
<b>Type of Ship + Cargo:</b> 79 - Cargo(No info)
<b>Type of elect. position fixing device:</b> 1 - GPS
<b>Length + Beam:</b> 190 m + 33 m

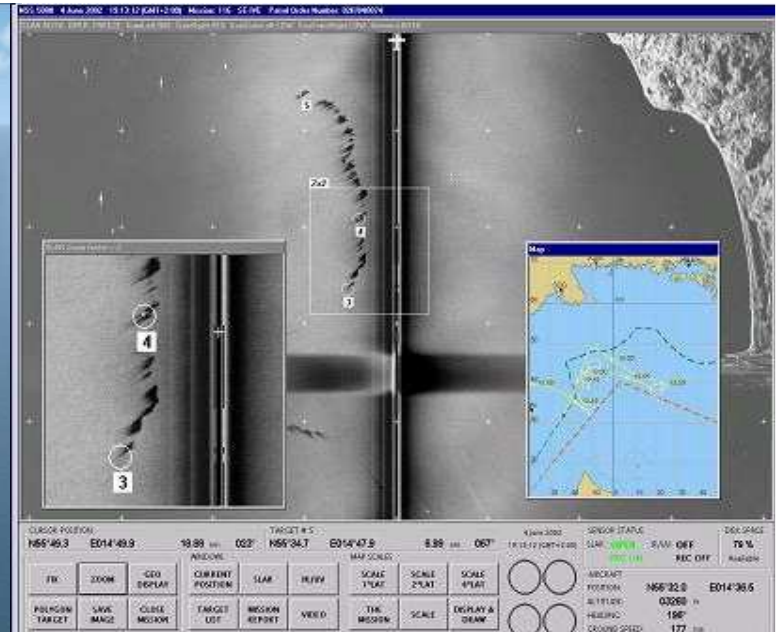
Done    Internet | Protected Mode: Off    100%

23:05  
2010/11/20

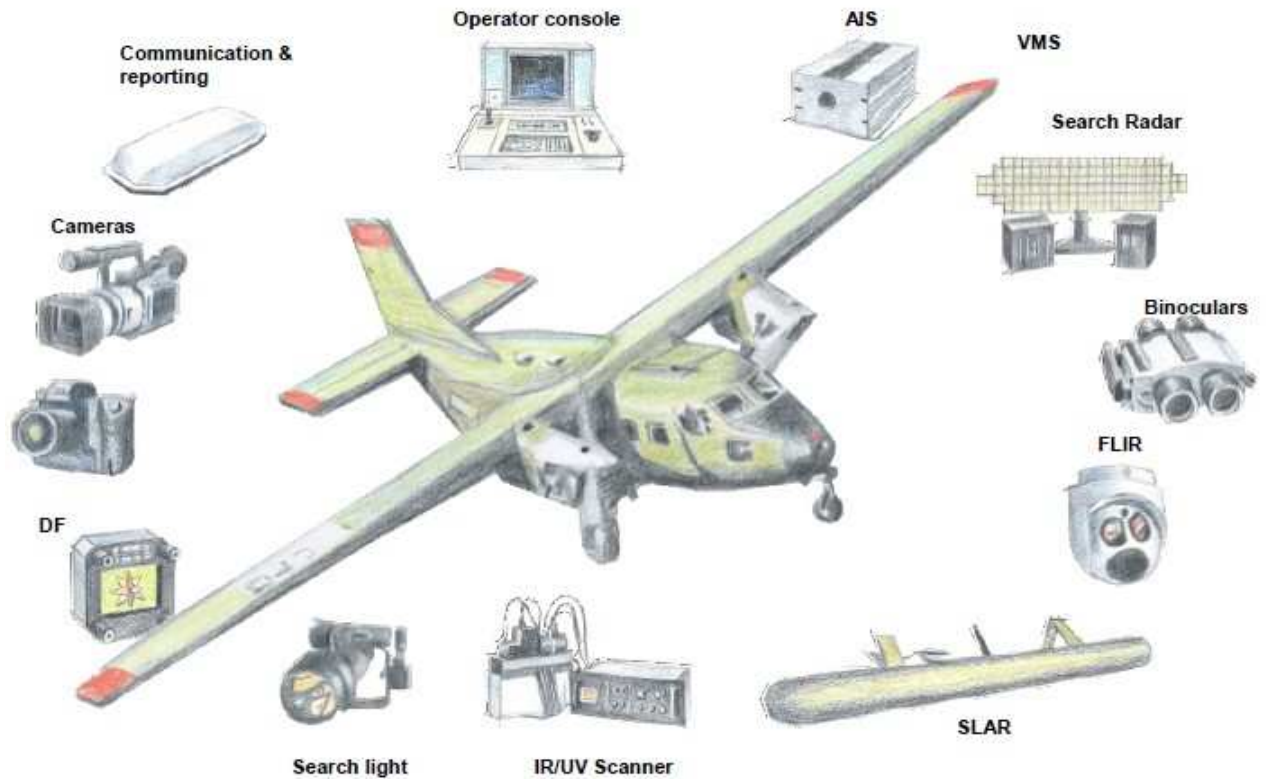


# Aerial Surveillance

## Multi-sensors



# Sea Watch System sensors



# GPS usage tomorrow

GPS is integral to most applications used in the maritime environment today, and definitely into the future:

- e-Navigation (IMO & IALA)

*'e-Navigation is the harmonised collection, integration, exchange, presentation and analysis of maritime information onboard 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'*

- Maritime Domain Awareness (MDA)

*'to proactively detect, identify, track and monitor vessels and access vessel's static & dynamic data (ship's details, crew, owner, operator, insurer, cargo, fuel, etc '*

# What is a marine Aid to Navigation (AtoN)?

## *Definition of a marine AtoN*

‘A device or system external to vessels that is designed and operated to enhance the safe and efficient navigation of vessels / and or vessel traffic’



# Why are AtoN provided?

AtoN are provided and operated to:

- Compliance with national & International Conventions, Agreements, Legislation & standards, with the purpose of:
  - ✓ Reducing loss of life, and assets, at sea
  - ✓ To protect the marine environment
  - ✓ To enhance maritime safety of trade



## Examples of AtoN Cont..

- **Radio Navigation systems**

- Positioning systems

- Global Positioning System (GPS) & Differential GPS, Racons (radar transponder beacon)

- Reference systems

- Electronic charting systems (ECS), Electronic Chart Display & Information System (ECDIS)

- Information systems

- VTS, Ship Reporting System (SRS) and Automatic Identification Systems (AIS)



# International Law of the Sea

## Safe Navigation - Obligations of a Coastal State

- Rights of navigation are necessary for the safe passage of vessels engaged in internationally accepted trade.
- Coastal States to advise vessels in passage through its territorial waters of possible hazards and dangers to navigation, such as aids to navigation, hydrographic services (nautical charts, NAV Warnings, weather forecasts, etc).



# **Differential Global Positioning System (DGPS)**

**Service provided by Lighthouse Services,  
a division Transnet's  
National Ports Authority**



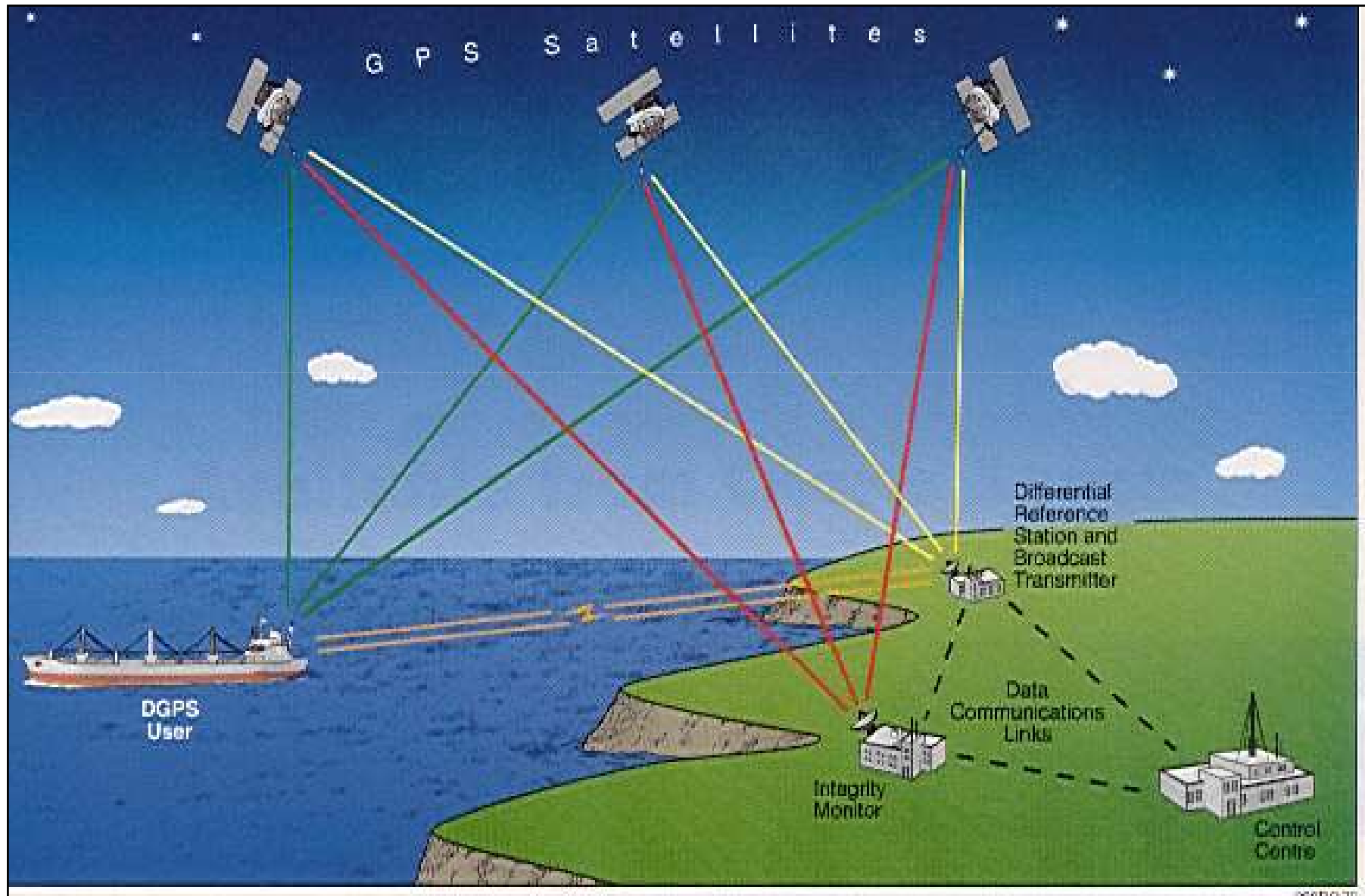
# Differential Global Positioning System (DGPS)

- DGPS is an augmentation (supplement) system for reducing the errors in the GPS signals within a localised area.
- DGPS reference stations compares the accurately surveyed positions of the DGPS station against positions determined from the GPS satellites in view.
- Messages containing positional errors and satellite integrity (health) information are broadcasted for users who have the appropriate receivers.





# Differential Global Positioning System (DGPS)

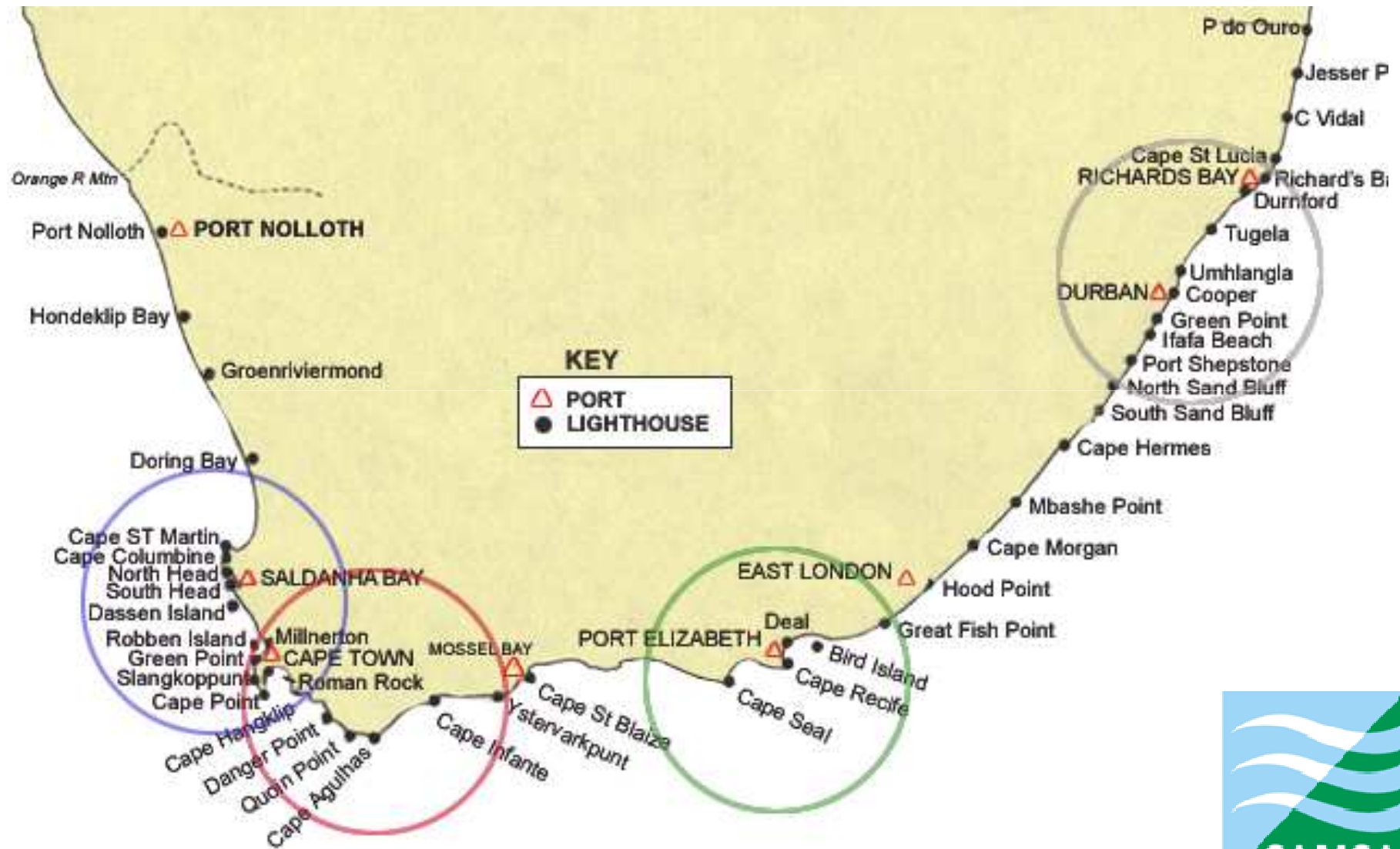


# Differential Global Positioning System (DGPS)

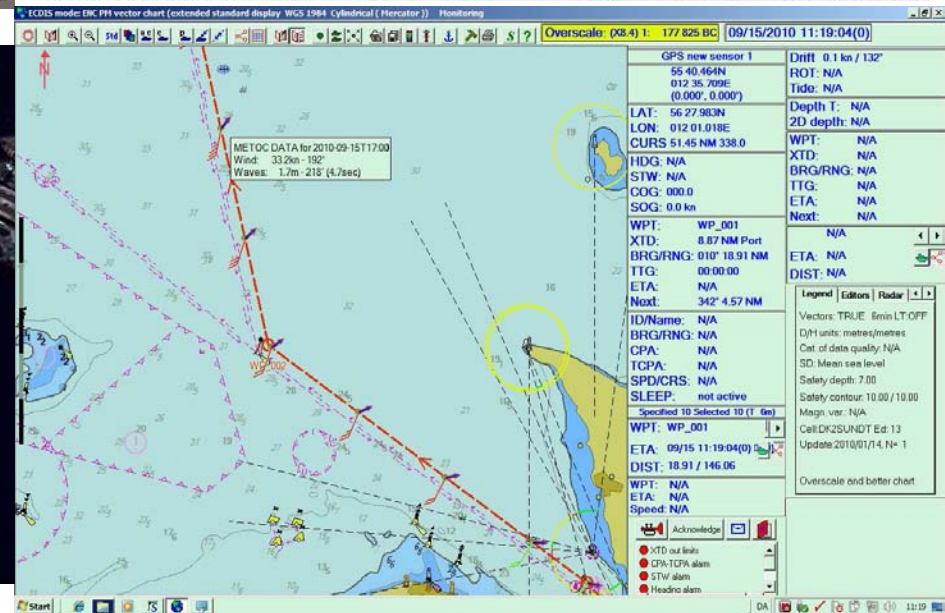
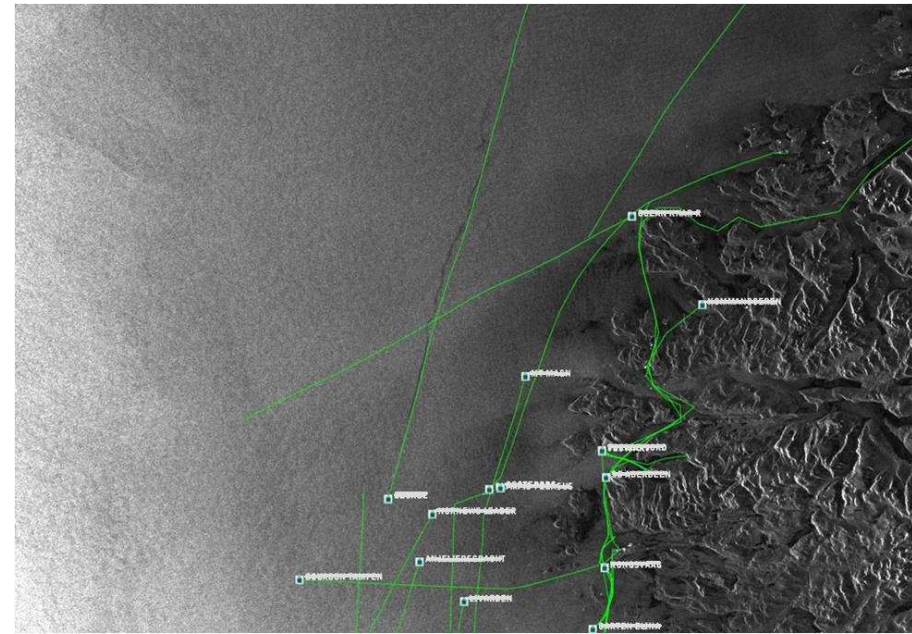
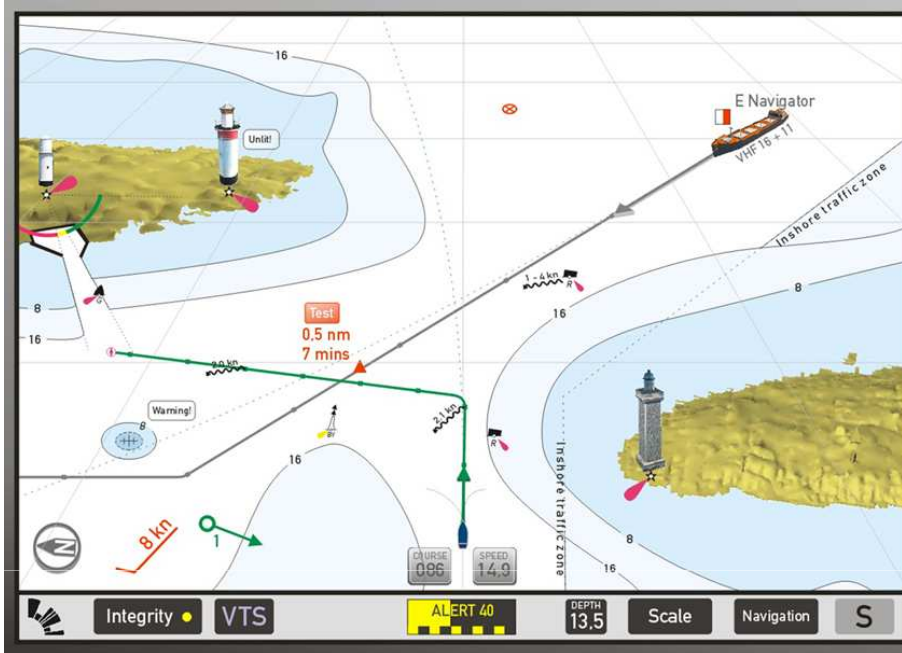
- The main objectives of DGPS is:
  - Integrity monitoring - almost immediate notification of faulty satellites (compared with up to two hours with GPS)
  - Enhanced (improved) positional accuracy within a localised area
- There are presently 4 DGPS reference stations in SA. The intention is to establish another DGPS reference station to cover the Richards Bay area



# SA's DGPS reference locations and range

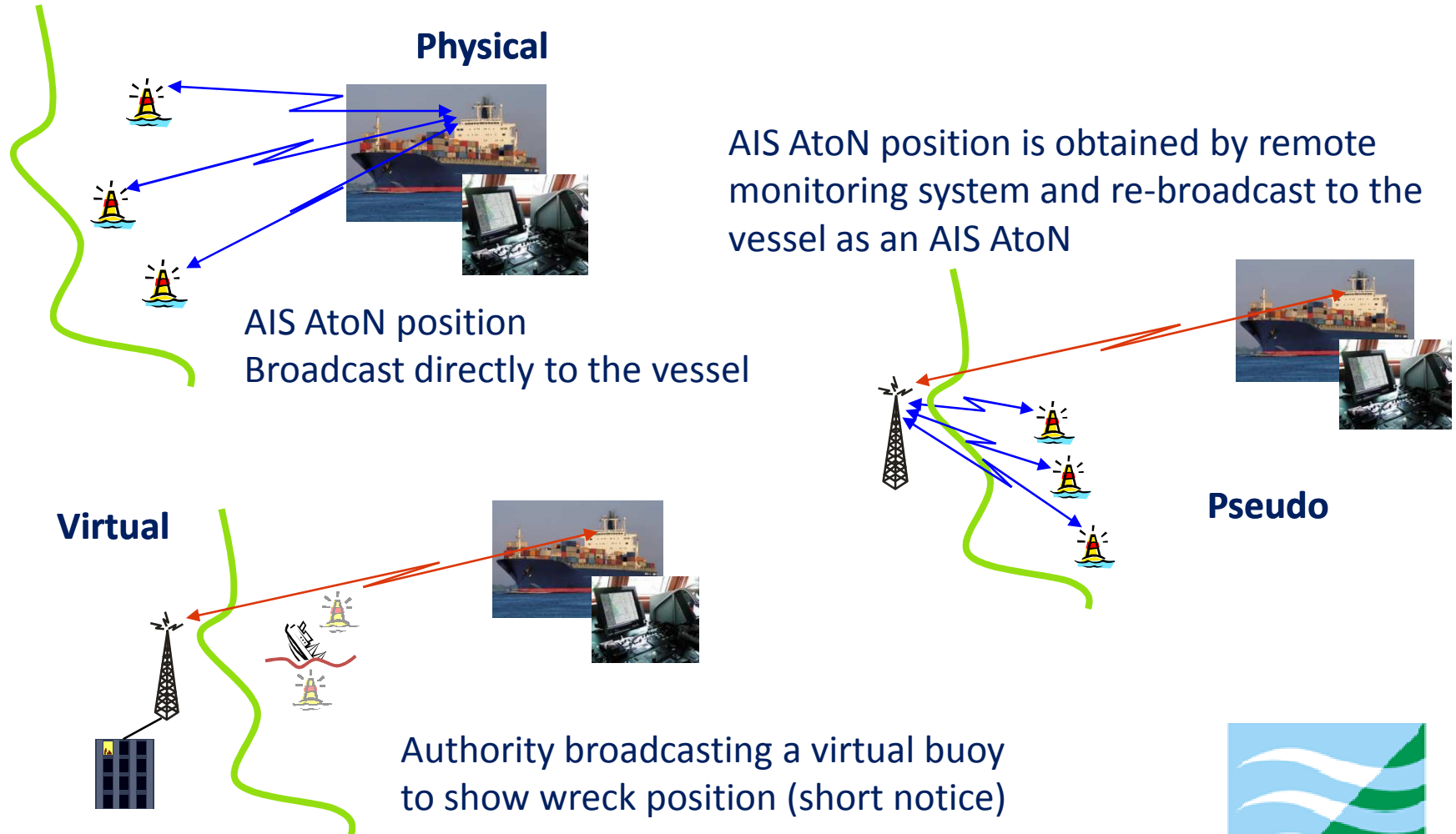


# Today ... moving to Tomorrow



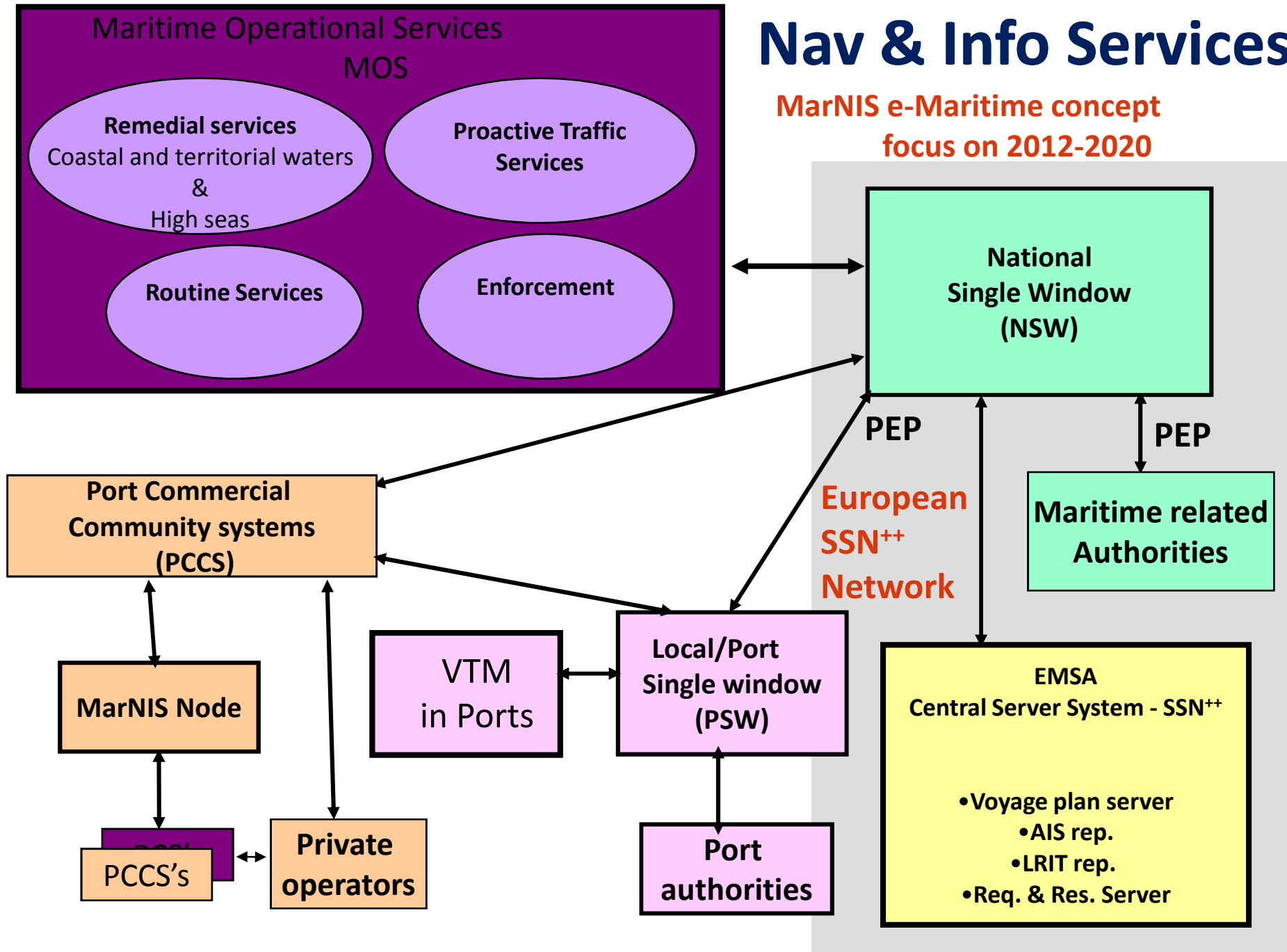
# Aids to NAV in the digital age

New technologies being developed to meet the demand for “information”



# Nav & Info Services

MarNIS e-Maritime concept  
focus on 2012-2020



# What will be required for Tomorrow ?

- Immediate access to accurate, reliable, dynamic data for integration into Maritime Information Services
- Maritime Domain Awareness (MDA) – single-window – access to ALL navigation & vessel data and information
- Environmental data is VITAL to add real value for safety (people + assets), efficiency and environment protection benefits
- Capacity to monitor & track all vessels offshore and inland (commercial, fishing, sport and recreation) – single transponder for all national vessels

An aerial photograph of a large cargo ship sailing on a vast blue ocean. The ship is moving from the bottom right towards the center. In the background, a range of dark, rugged mountains stretches across the horizon under a clear sky. The text 'THANK YOU' is overlaid at the top in a large, dark blue font.

# THANK YOU

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Centre for Sea Watch

& Response

Cape Town