

VMAS



Vessel Monitoring and Advisory Services
e-Nav Underway 2013

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Purpose of VMAS

- To determine and mitigate the risk of vessels to;
 - Safety of life
 - Other Vessels
 - Environment
 - Aquaculture
 - Coastlines
 - Offshore Infrastructure

Risks (VM)

- Ship carrying out operations contrary to regulations
- Adverse weather
 - Ship encountering heavy seas.
 - Ships encountering ice or experiencing ice accretion
 - Ships encountering restricted visibility
 - Ships not adjusting routing to compensate for weather.
- Severely hampered vessels
 - Engine breakdown
 - Structural failure
- Unreported deliberate incapacitation
 - Engine maintenance
- History of “risk” through intelligence of company, cargo or vessel
 - Engine reliability
 - Cargo residues – Hold / Tank cleaning

Risk Mitigation - Static Data sources

- Static / Historic data sources.

- Engine Failures
 - Casualty records
 - Changes in velocity
- Port State
 - Port State Control records
- History of ships path
 - Terrestrial or Satellite AIS
- Cargo
 - Last ports of call

- From Ship ???

- From Shore – More reliable

Risk Mitigation-Dynamic Data Sources

– Dynamic data Sources

- Frequent or preferably continuous Position & Velocity vital for ascertaining whether the vessels is navigating in a safe manner.
- Indirect
 - Exchange of information with other states
- Direct
 - Periodic Ship Reporting (Global)
 - Terrestrial AIS networks (<200NM)
 - Satellite AIS (Global but Limited ability in dense areas)
 - Radar (Other than OHR, limited to < 100NM)
 - Periodic Dynamic data feed (AIS extracts) embedded within Communication Satellite data stream.

Access to Dynamic data Tracking

- Method of data access- AIS, S-AIS or other (VITAL)
 - Own administration subscription to service provider
 - Other States that may have information through another service provider.
 - Exchange of information necessary to ensure that the latest dynamic information is available to enable proper evaluation of risk.
 - Breach of commercial agreements?
- Data
 - Velocity, Ships heading, ROR Navigation Status, Draught.....
 - Interpretation - Intelligence
 - Path and route consistent?
 - Ships heading and track consistent?
 - Unexpected deviations of velocity?

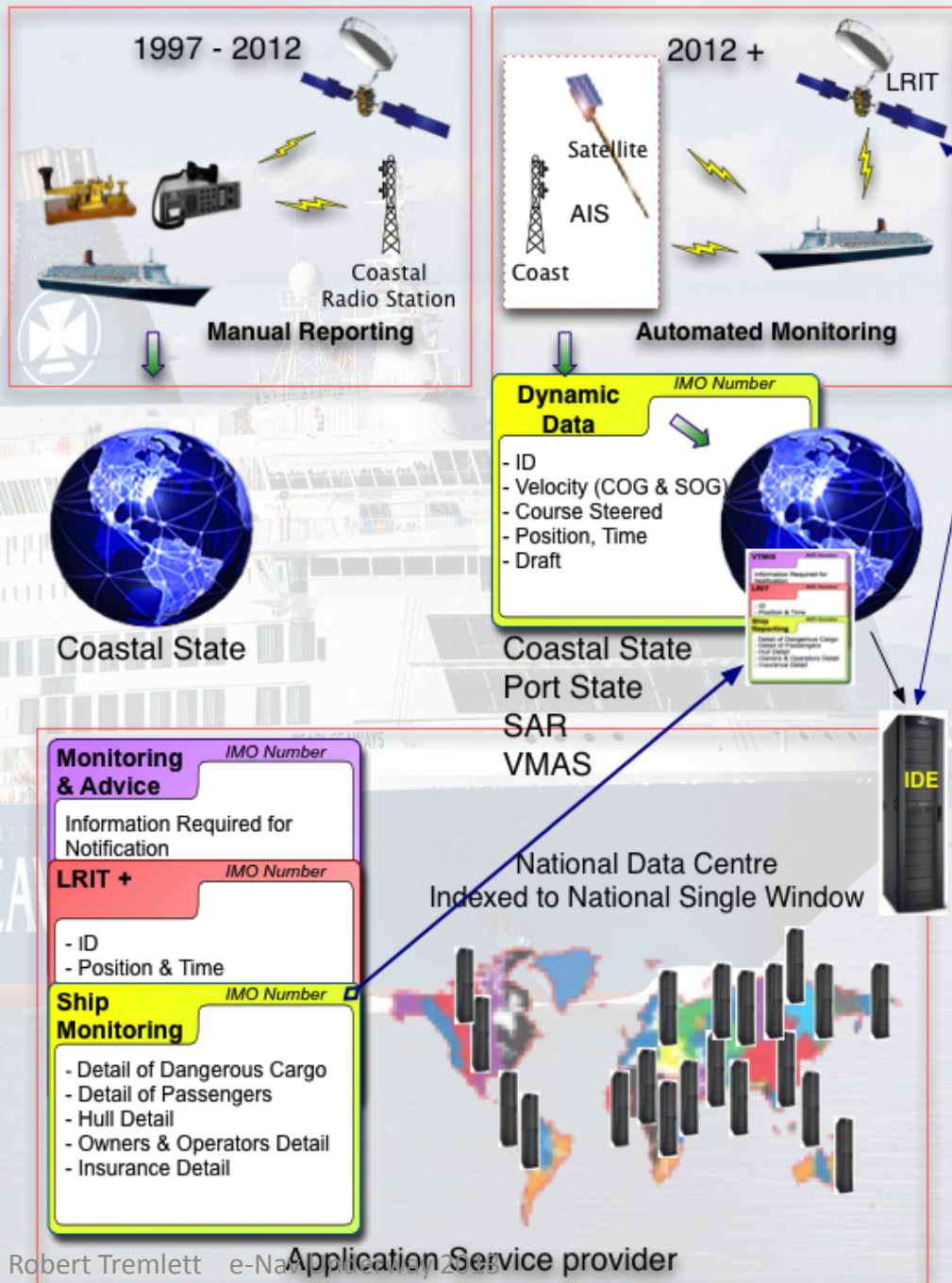
Risk Mitigation – Data Linking

- Data Linking
 - Tagging of the location of static information to dynamic data of a Vessel being tracked.
 - Tracking Vessels using appropriate technological solutions
 - S-AIS, AIS, or Velocity and ships heading by other means
 - Access to Static information
 - Server providing continuous update of the location of latest information on;
 - Evolved traffic / ship monitoring (AIS SAT AIS)
 - Exchange of Port State Control
 - Exchange of “risk rating” on vessels
 - Exchange of Hazardous events
 - Exchange of vessel Incidents
 - Exchange of Traceable Voyage History
 - Exchange of Cargo Information
 - Conformity to Maritime Advisory Services,
 - Hull,
 - Cargo,
 - Owner,
 - Passengers etc...


Access to Static Information

- Method to access Information
 - Data Index exchange
 - Linking Coastal State VMAS through National or regional Single Windows to source of information.
 - Enabling source of information to be constantly updated, but not the detailed information.
 - Intranet to access static information via National or Regional single windows to provide access to all detailed information as and when necessary.

VMAS DATA



Advisory Services (AS)

- Advisory service 
 - Needed to provide advice to **ALL** Vessels whatever their size or type.
 - In such a manner it can not be confused
 - Language independent graphical portrayal
 - Provide Multilingual Alpha numeric information
 - » in user language.
 - Advisory Information required
 - Recommended actions for Routing, Speed
 - Based on sea state prognosis, ship type, cargo and vessels history, availability of Pilots / Port / Berth.
 - Automatic update of Maritime Safety Information
 - Weather forecasts (Ice, sea state, visibility)
 - Status of Aids to navigation
 - Chart corrections

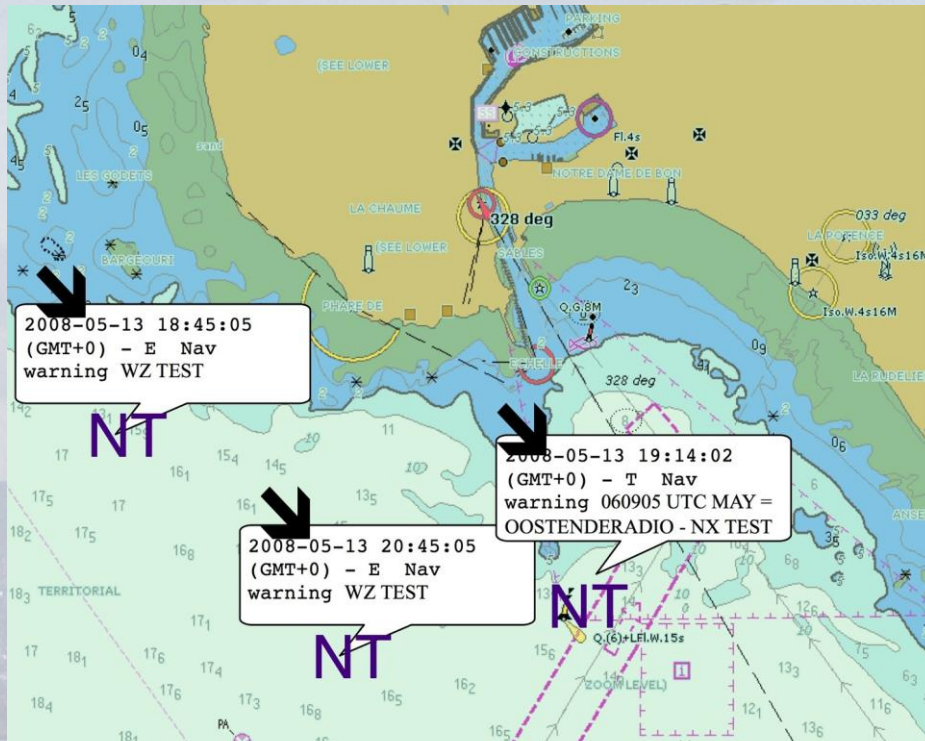
Possible Solutions (Static Data)

- Use International LRIT Data exchange and National data centers.
 - Fit for purpose
 - Proven to be secure
 - Existing infrastructure
 - No additional costs
 - To facilitate index via single windows;
 - To where categories of information is held.
 - To exchange of dynamic information on vessels (S-AIS or Satellite communications streamed AIS)
 - Coastal, Port States and Flag States may have an interest in whether the vessel has taken advice offered or has chosen to ignore it.
 - Status of conformity pushed via IDE to the data centre of the flag State.
 - Where cooperation exists, status pulled using IDE by Port or Coastal State.
- Create International Maritime Intranet for access to detailed information located by use of IDE

Language Independent / Multilingual

- Requires Data libraries
 - Aboard and ashore enabling the automatic coding and decoding of messages to facilitate;
 - Codified messages using standardized data libraries for safety of navigation messaging
 - Data libraries coded from any language
 - language selected by operator
 - Communication of information is minimized.
 - Main information stored within data libraries.
 - Portrayal
 - Decoded into any language
 - Decoded into simple schematic or rich data images
 - » Graphical portrayal via ECDIS or other display
 - Precedence - International Code of Signals
 - Protocol IHO S-100 ?

Data libraries



2008-05-13 19:14:02 (GMT+0) - T Nav warning
060905 UTC MAY = OOSTENDERADIO - NX TEST = COASTAL ROUTE /
OOSTENDE / KNOKKE-HEIST Z-A3 LIGHTBUOY, 51-21.06 N 003-11.45
E, TEMPORARILY WITHDRAWN.+ NNNN

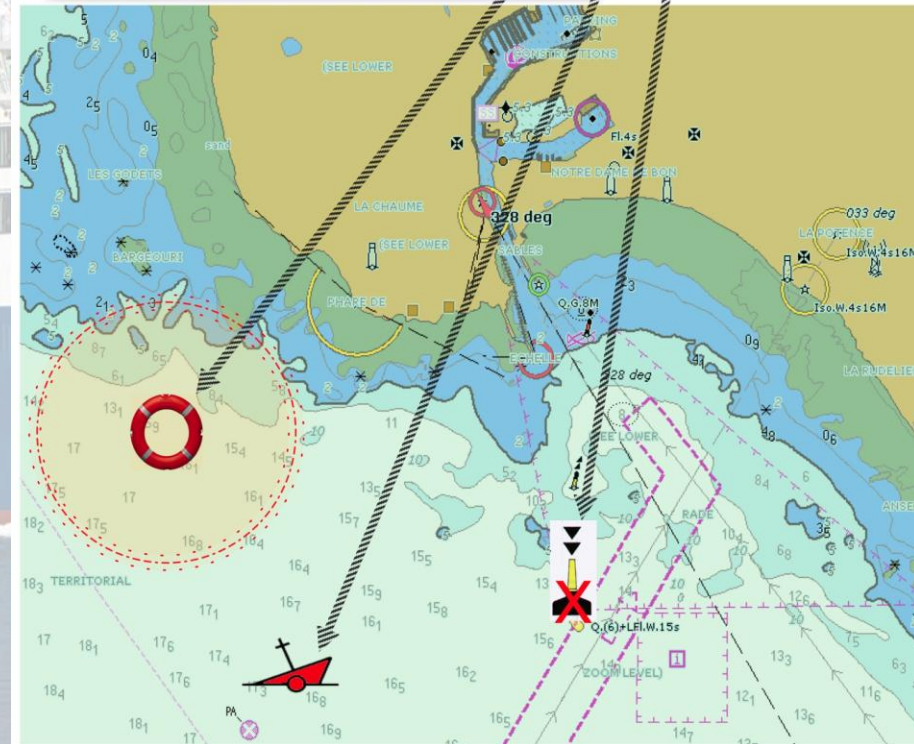
2008-05-13 20:45:05 (GMT+0) - E Nav warning
WZ TEST ENGLAND, SOUTH COAST. THE SOLENT, WESTERN PART. WRECK
OF 7 METRE DINGHY WITH SAILS AND IGGING REPORTED 50-45.24N
001-21.98W. CAUTION ADVISED. NNNN

2008-05-13 20:45:05 (GMT+0) - E Nav warning
WZ TEST ENGLAND, SOUTH COAST. THE SOLENT, WESTERN PART. MAN
OVERBOARD REPORTED 50-45.24N 001-21.98W. CAUTION ADVISED. NNNN

ENC NAVTEX Message
"A" Navigational Warning concerning a Cardinal buoy missing
ZCZC-B1B2B3B4
E-Q-LL.LL-III.II-XXX-WxWx-S-X1Y1-ZZZZ

ENC NAVTEX Message
"A" Navigational Warning concerning a wreck
ZCZC-B1B2B3B4
E-Q-LL.LL-III.II-XXX-WxWx-S-X1Y1-ZZZZ

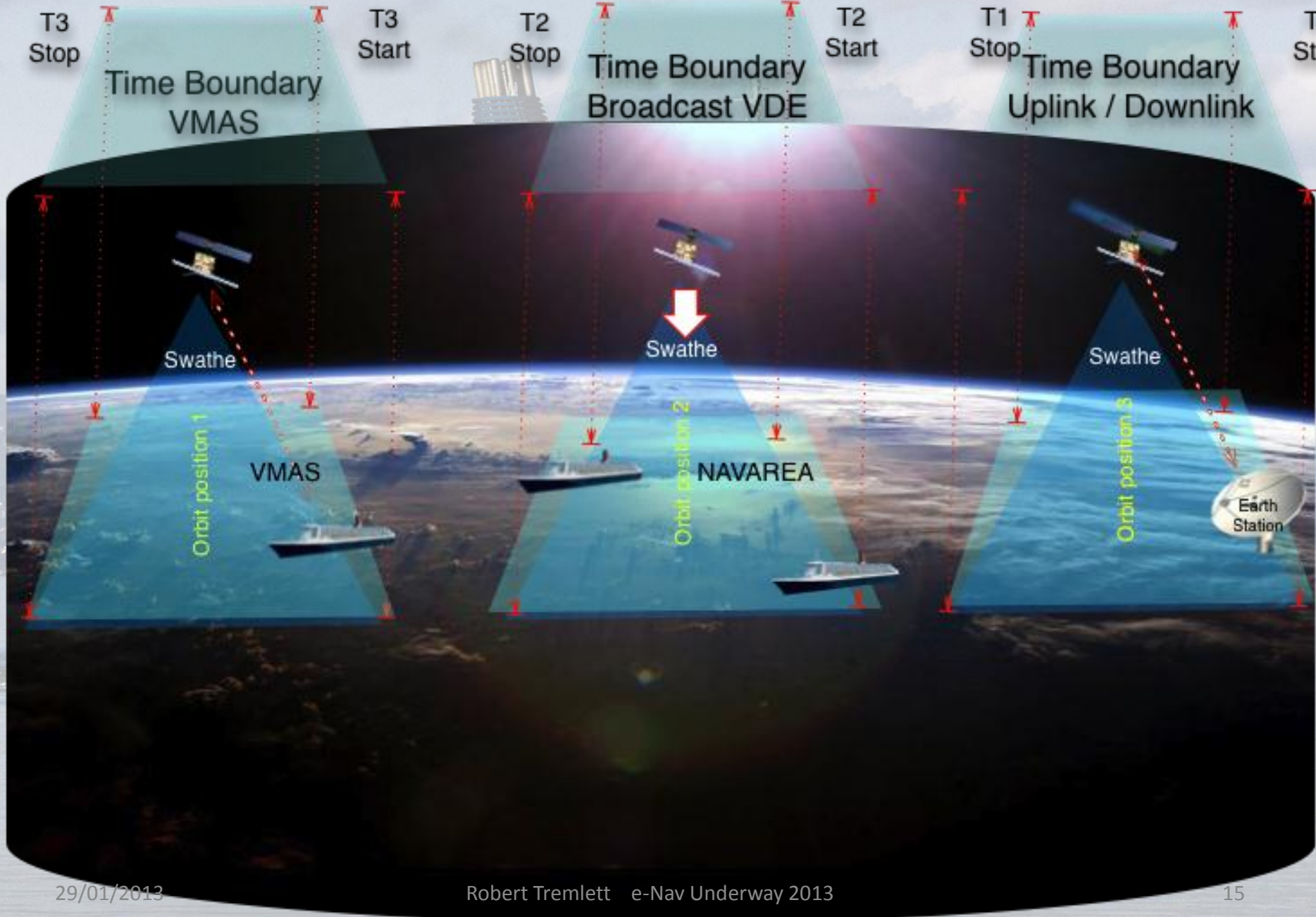
ENC NAVTEX Message
"D" SAR concerning person lost overboard
ZCZC-B1B2B3B4
E-Q-LL.LL-III.II-XXX-WxWx-S-X1Y1-ZZZZ



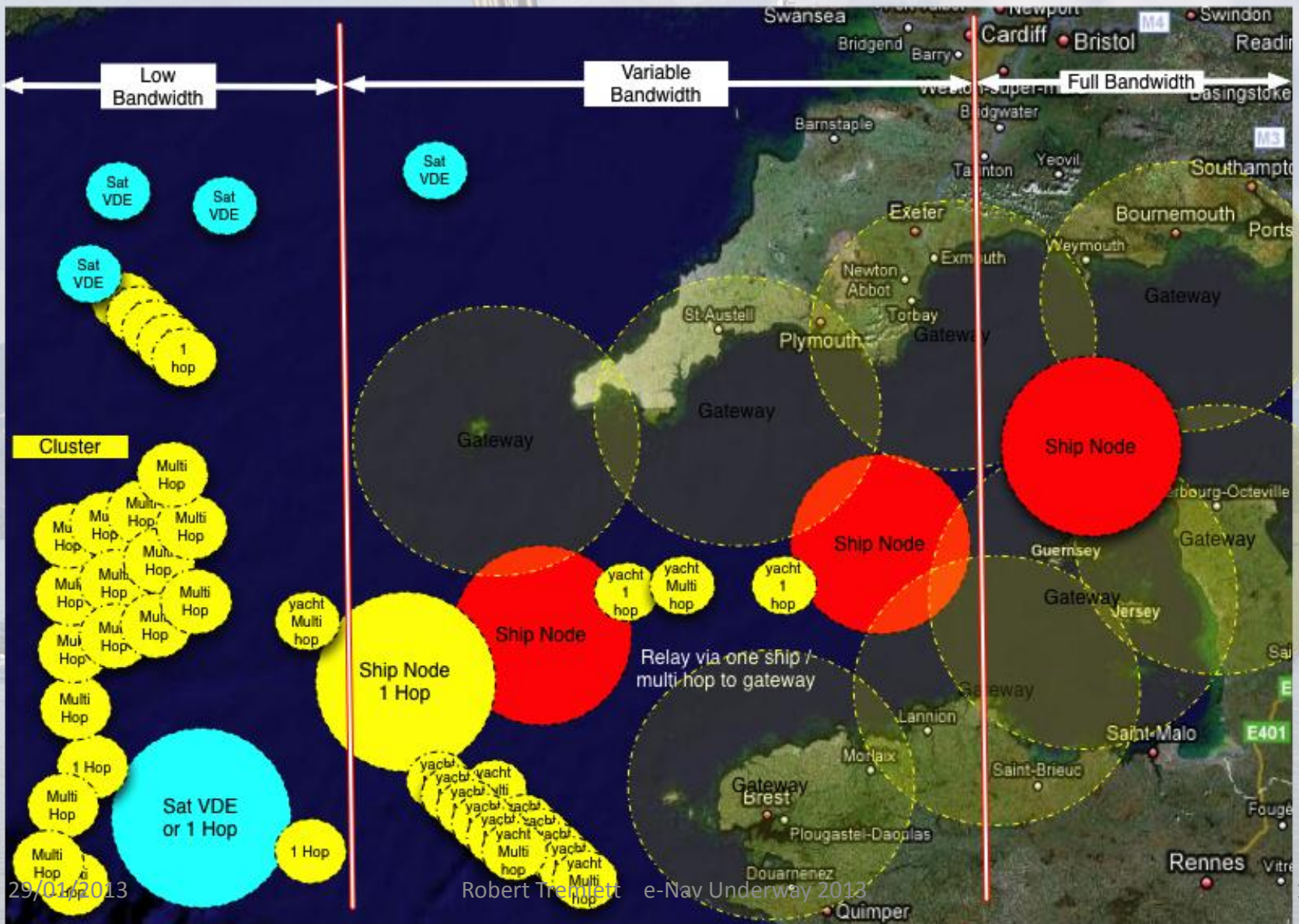
Possible Solutions - Communicate

- Terrestrial and satellite services
 - Provide ALL users with reliable robust services having redundancy options.
 - Digital VDE and VDES
 - Redundancy, where required for satellite services can be provided by Surface or Airborne assets in event of satellite constellation failure.
 - Intelligent use of bandwidth and possible use of multi-hop VHF protocols.
 - Need to define how VDE and VDES can be efficiently used to support e-Navigation – ship ship, coast ship, Satellite ship.
 - Need to quantify scope and scale of VDE.
 - VDE and VDES could be the backbone of communications for all safety of navigation GLOBALLY for ALL vessels,
 - What about HF for exchange of small packets information, could this be used as a robust back up carrier driving data libraries?

VDE Satellite



VDE Multi-hop – (SEAMAX 2004)



VDE Optimization

- Efficient VDE requires “Novel Spectrum protocols” offering
 - Broadband when in range of terrestrial Base Station
 - 150 khz
 - Intelligent use of bandwidth when **not** in range of base station for multichannel low bandwidth data exchange
 - Base Station could be a Satellite or Coastal
 - Instead of 25KHz
 - Coastal - 6.25 Khz or even 3.125 KHz instead offering multiple data channels.
 - Satellite 12.5 Khz or 6.25 KHz (if feasible)
 - When monitoring / communication vessel clusters
 - Nodes ONLY when joining or leaving peer group.
 - Minimize localization part of message.
 - Maximize Number of channels to facilitate monitoring of several thousands of nodes.

Conclusions

- To facilitate VMAS
 - Adopt International Data Exchange designed for LRIT
 - We can still use the infrastructure to access LRIT
 - Use Single Windows and secure Intranet
 - Maximize number of vessels that can receive MSI
 - ALL VESSELS
 - Install Data libraries ashore and aboard (SDR)
 - Create small data packet messaging to drive them
 - Provide intelligent VHF protocols for VDE
 - Investigate use of HF?
 - Investigate the scale and scope of data.
 - Needed to define appropriate protocols and carrier needs.
 - Provide harmonization for fusion of dynamic and static information

e-Navigation Underway 2013

VMAS is a classical e-Navigation App!!!

- The components needed will also facilitate other e-Navigation applications.
- Bon Voyage!

