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.
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?
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 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
VMAS is a classical e-Navigation App!!!

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