CRS&SI Technologies in the Maritime Industry
A Path to Securing Marine Commerce and Supporting Trade

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E-Navigation 101

- What is it
  - Why is it important
  - What are some key aspects and components
  - How should it all work

- Role and Responsibility of Government Agencies
  - Challenges and Opportunities
  - Ship to ship & ship to shore issues
  - Providers versus Users

- User perspectives
E-Nav

• Definition by the International Maritime Organization
  “the harmonized 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”

• 975 million tons of American imports and exports moved by water (2012)
Navigation Situation

- Ships continue to get bigger
- Available channel depth and width are more critical
- Available air gaps are more critical
- Western Rivers traffic increase
- Multiple entities competing for waterway usage
- International standards are being developed
- Technology continues to advance
Benefits

- Shipboard navigation systems
  - Should be more viewed as GIS in your car than drone technology
  - Integration of ship sensors, supporting information, standard user interfaces, comprehensive system for managing guard zones and alerts
  - Reduce human error while actively engaging the mariner in the process of navigation
  - Evolving to include logistic efficiency and environmental benefits
History

- 2005: Japan, Netherlands, Norway, Singapore, UK & US recommended the IMO take up the concept – combine extant and nascent electronic navigation tools

- 2007: First substantive test in SE Asia “the Marine Electronic Highway project
  - Attainable and should be aggressively pursued
  - User-driven
  - Not replacing mariners
  - Mandatory training
  - Patent and maritime law – respected and updated

“E-navigation should support mariners in the maintenance of safe passing and clearing distances and collision avoidance” IALA
History Continued

- 2010 – Focus on E-nav as a technological paradigm driven by the needs of Mariners, rather than vice versa
  - Common Data Structure
  - Automated and Standardized Reporting Functions
  - Effective and Robust communications *between vessels*
  - Human Centered Presentation Needs *to optimize support for decision-making*
  - Implementation Issues (including training and familiarization)

- 2011 – Rapidly emerging technologies

- 2013 – Cyber security risks

- 2014 – Increased private/national product development with no international agreement (MONALISA 2.0 and MADRAS)
Slow adoption/coordination

- USCG, NOAA, USACE Public Hearings
  - 2/3 of recreation boaters and 1/3 professional mariners
  - Professionals are already well-versed in the theory and practice of e-nav or are more resistant to acceptance of the e-nav concept and more reliant on traditional methods

- “I would consider the greatest impediments to developing and deploying new technology in the marine industry to be resistance to change, unwillingness to invest, and the time lag from innovation to deployment. The typical mariner has relied on traditional means of navigation for many years, and they are unwilling to accept new technology as a replacement for the traditional means. Many will accept new technology as an augmentation, but they won’t let go of the past.”
Current Project Data

- Emailed survey to a purposeful sample as indicated by E-Navigation Underway, North America
  - 29 surveys: academia, corporate, government, industry and military
  - 11 returned

- Content Analysis
  - Education & Training
  - Generational Factors in Acceptance
  - E-Nav Facilitating – Not Replacing
  - Software Integration of International Maritime Regulations
  - Government-Industry Committee Collaboration to Promote E-Nav (top down)
Summary of Findings (to date)

- Industry - Real-world experienced mariners perceive the greatest stake in implementation, No shore-side Automated Vessels, All about safety

- Academia – Education and training are essential, lack of cyber security awareness

- Corporate/Industry – Implementation of E-nav both vessel and shore side should be done slowly, goal is to facilitate not replace, magnitude of security problem

- Government – cyber security, redundancy – facilitate not replace
Conclusions

- Lack of understanding of E-Nav priorities and how development will proceed.
- E-nav has not been proved to reduce accidents attributable to human error
  - Bridge resource management – human factors
- Demonstration projects/test bed activities need to provide cost/benefit information to justify implementation
- Educational measures should have a higher priority about reporting responsibilities and bridge resources
- Full utilization is unlikely until the equipment certification process is more flexible and adaptable to evolution of technology – Balance between “Standards” and “Guidelines”
Recommendations

- Manufacturers should adopt inter-vendor operability
- Validation of BRM practices should become a primary responsibility of ship managers and insures (reward good practices)
- Significant groups of stakeholders remain un or under involved: recreational boaters, inland waterway pilots, shore side, marine electronics manufacturers
- Equipment certification should be made more flexible
- Automate ship reporting to the extent possible, exploiting the “single window” concept
Thank You

Comments or Questions?

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