



# Training Concerns for New Navigation Technology

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# New Bridge Equipment 2008

- GPS
- ECDIS
- ECS
- NAVTEX
- AIS
- Integrated systems
- DP systems
- Position prediction displays



# Views of the Future! 1990

- **Bartlett 1990, Ship of the Future 2000** “  
Navigation systems for the ship of the future should be integrated with a number of identical easy-to-read intersitchabe displays which require minimal training” (wishful thinking?)
- **Weiler 1990, Ship of the Future 2000**  
“ ships of the future will use automated systems and will require crew members with relatively high levels of technical competence, certification in multiple fields as well as significantly higher levels of ship specific training.”
- **Were they at the same conference?**



# Early Warnings

- Sanquist, 1993, Impact of New Technology on the Marine Industry
  - “The increasing technological sophistication of ships navigation systems may **significantly alter** the skills, knowledge, and strategies involved in navigating large ships”
  - “it is clearly important to understand the cognitive tasks involved with advanced navigation technology to guide better designs and **develop better training.**”
  - “Computer based technologies can also introduce **new cognitive demands** that include monitoring more ships, forming mental models of new technologies, and performing **complex mental** scaling and transformation to accommodate electronic versions of paper charts.”



# Knowledge & Understanding of Bridge Equipment

- Many mariners have embraced the use of new technology and use it routinely
- Advanced navigation systems are being fitted and used aboard ships at a rate faster than best practices are established
- Do the majority of today's mariners know how to use this new equipment effectively or correctly?
- Of even a greater concern. Do mariners have misunderstandings of the equipment's capabilities, or have they developed poor habits in its use due to self teaching

DR. Barry Strauch NTSB  
Nautical Institute / USMMA Seminar  
on Bridge Resource Management  
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- “Traditional training primarily:
- Ensures familiarity
- Overlooks proficiency
- Overlooks most challenges presented by highly automated systems”



# Solution?

- Identification of new knowledge and skills must be accomplished
- Major restructuring of curriculum to include these knowledge and skills and the sequencing of prerequisite course at maritime institutions is necessary
- Officers serving at sea will also need training to acquire these knowledge and skills.
- Five year license renewals should include certification on new equipment not recertification of old skills, some of which are no longer in use.

# Training & the "S" Mode

- Problem: It is extremely difficult to train mariners to a high level of competence (90%) on **all types** of electronic navigation equipment (ECDIS as example)
- Most schools and Training facilities have one type of ECDIS for training.
- They can train to a high level on that equipment
- But; At what level would they be at another type?
- How long would it take to come up to speed on another type?

# Training & The "S" Mode

- "S" Mode would allow standardized training
- Mariners would join ships with a very high level of competence using the "S" Mode and be able to operate equipment safely immediately.
- They would also have a high degree of competence on one type of equipment.
- Additional type training could take place on board.

# Distractions

- Situational awareness can be lost due to distractions
- A new distraction is that of “DISTRACTION FROM LEARNING”
- Many officers may lose situation awareness while they are trying to learn how to use new electronic navigation equipment placed on board the vessel while standing a navigation watch.

# Solution

- Manufactures supply equipment that can be operated in a **simulation mode** with tutorials on the operation of the equipment and canned simulation exercises.
- Officers will be able to train on new equipment off watch or in port.



# Information Overload

- There is general acknowledgement that there are limits to how much of information an individual can effectively process, especially:
  - Under pressure
  - Unfavorable environmental conditions
  - When fatigued
  - During emergencies



# Information Overload

Information overload:

- Can be a detriment to situation awareness
- Can be distracting
- Can cause confusion
- Can delay necessary action



# Research is needed Control Commander Study Resource Rich vs. Resource Poor

- Less able to prioritize information
- Information inspection took precedence
- Trapped in reaction phases
- Unable to optimally regulate levels of information acquisition and control
- Amount of strategic thought might be greater in a under resourced environment.