

# Test and Evaluation

The Key to Successful Acquisition Outcomes



**Homeland  
Security**

Science and Technology

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# DHS Test & Evaluation Year in Review

- USCG Fast Response Cutter FOT&E
- ICE TECS Modernization IOT&E
- TSA Technology Infrastructure Modernization FOT&E
- National Cybersecurity Protection System Einstein 3 Accelerated OA
- USCG Polar Icebreaker Ice Tank Model Testing (Canada NRC)
- Transportation Security Laboratory Capability Expansion
- Rapid Response Threat Characterization LFT&E
- CBP TECS Modernization IOT&E
- TSA Automated Screening Lanes Urgent Operational Need Operational Utility Assessment (OUA)
- TSA Passenger Screening Program Advanced Imaging Technology IOT&E
- USCG Offshore Patrol Cutter Early Operational Assessment (EOA)



TSA UON: Automated Screening Lanes

# Polar Icebreaker Model Testing

- US Coast Guard Heavy Icebreakers
  - Polar Star, commissioned 1976, active.
    - Lockheed Shipyard (closed 1988)
  - Polar Sea, commissioned 1977, inactive.
- Polar Ice Breaker Acquisition Program
  - Coast Guard plans to construct three
  - Sept 2015: POTUS accelerates delivery by 2 years.

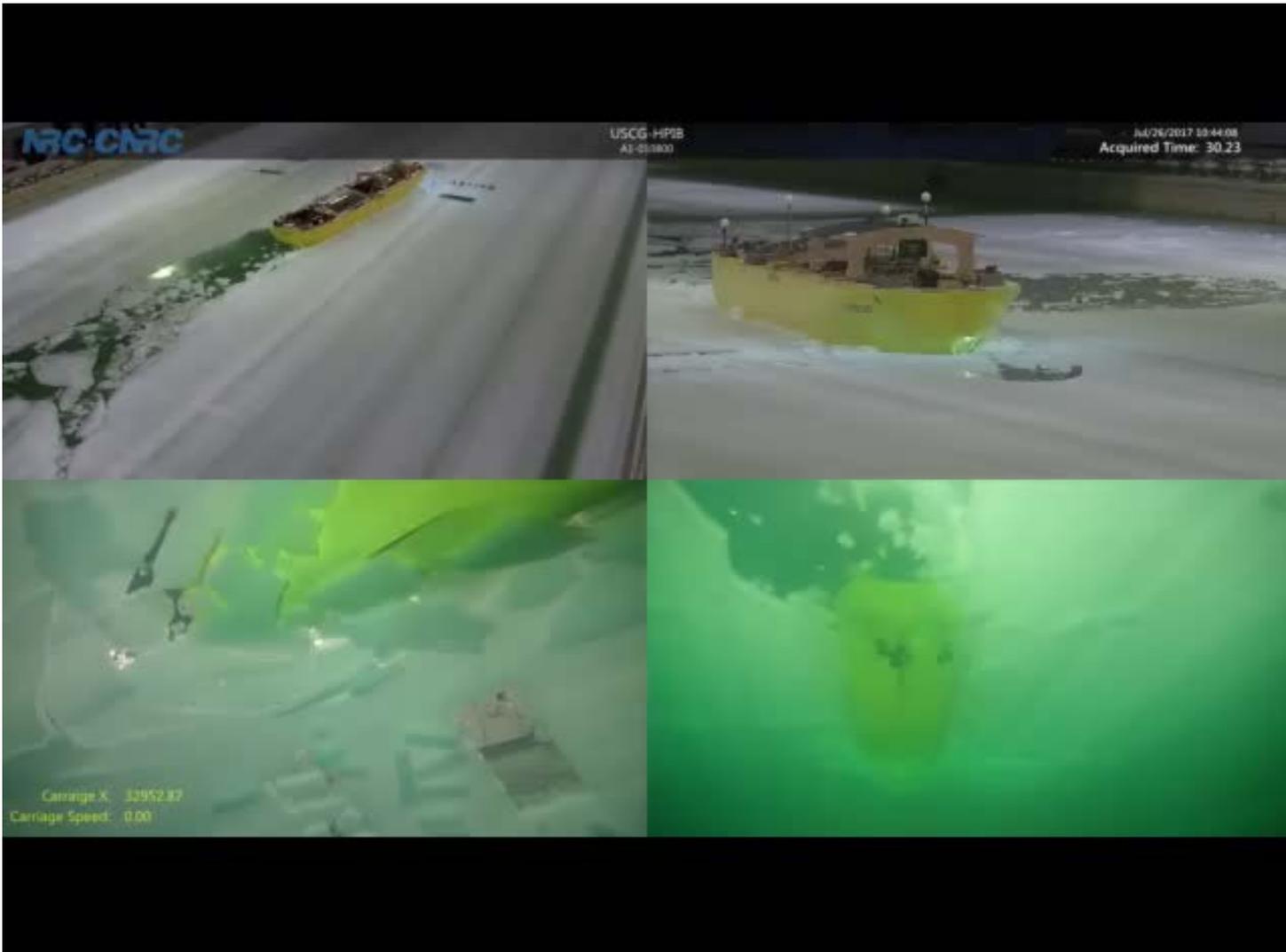


USCG Cutter Polar Star



- Challenge for T&E: how can we help this program be successful?
- Model testing at National Research Council, Canada, Ice Lab in St John's, Newfoundland

# Polar Icebreaker Model Testing



# Mission: Help Programs Succeed

Dr Hutchison's "Watch List"  
(factors that increase risk to success)

- Operational availability as a Key Performance Parameter
- Over-reliance on vendor DT&E
- Adversarial cybersecurity T&E
- Template test strategies
- Limitations to test
- Incomplete (or absent) threat assessments
- Qualified T&E managers

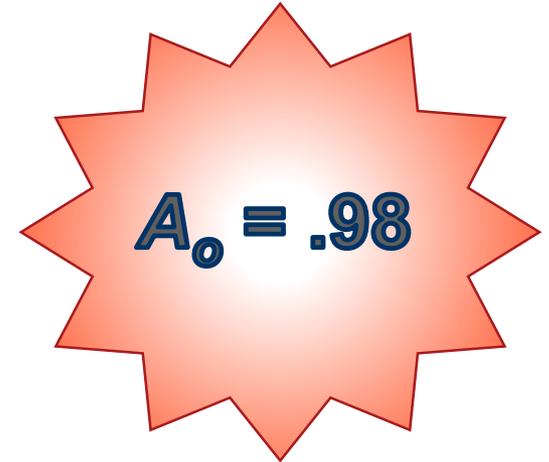


FEMA Mobile Emergency Response Support

The key to reducing the rate of unfavorable OT&E outcomes is to "Shift Left!"

# Operational availability as a KPP

- Most common factor contributing to unfavorable OT&E outcomes
  - failure to identify and remediate underlying reliability issues during DT&E
- Design and test for reliability!
- OTAs should include estimates of system reliability in evaluation reports
- DOT&E evaluation: if a system cannot complete the mission due to poor system reliability – even though it may be highly available – that system may be determined to be “not operationally suitable.”



If programs were to focus on just one area to improve the likelihood of a favorable OT&E outcome, it should be improving system reliability.

# Over-reliance on vendor DT&E

- Independent T&E is a tenet of good acquisition
- ...doesn't just apply to OT&E
- Most PMs rely on vendor to conduct DT&E
  - weak overtures to “integrated T&E” in the TEMP
  - the OTA will “observe” DT&E activities
- Recommendation: conduct an Operational Assessment (OA)
  - determine if the proposed system demonstrates *high likelihood* that it will satisfy the user's operational needs.
  - an OA is a DT&E activity
  - typically led by the program's independent OTA.
  - for IT systems, User Acceptance Test (UAT) can be considered the counterpart to the traditional OA



If the OTA would plan and conduct DT&E differently, the program manager should not rely on the vendor

# Adversarial Cybersecurity T&E

- IT systems must satisfy *security controls* consistent with risk categorization (low/moderate/high)
  - Security Test and Evaluation (ST&E) determines if the controls are met
- Cyber adversaries are not limited to exploiting vulnerabilities within the assigned risk categorization and security controls
  - potentially significant gap to operating securely
- Recommendation: T&E to determine if there is a gap to operating securely
  - engage a competent “red team”
  - use the National Cyber Range
- **Cybersecurity KPP** for all network-enabled capabilities



USCGC Bertholf intercepts semi-submersible drug vessel.

To improve operational resilience in cyberspace, we must test our systems the way the cyber adversary tests our systems.

# Template Test Strategies

- New programs recycle old test templates
  - “it was approved before, should be good enough now”
- No two programs are the same, therefore
  - no two integrated evaluation frameworks, and
  - no two sets of integrated test activities will be the same
- Agile programs are particularly bad
  - TEMP describes methodology to decompose user stories into executable test cases and data requirements
  - defers details to when the release backlog is known



USCG Cutter Polar Star

“Put the E before the T!”

# Limitations to Test

- Test limitations
  - identifies the measures in the evaluation framework for which the desired conditions may not be achievable
  - provides a suitable alternate T&E methodology to be used
- Test limitations typically include
  - not enough operational hours to answer the availability KPP
  - not enough users to verify system performance under a required load condition
  - not enough test assets
- Alternate T&E methodologies can include
  - use of data collected during DT&E
  - augmenting live operations with simulation
  - use of a cyber range



USCBP Mobile Video Surveillance System

“Don’t tell me what you won’t do, *tell me what you will do.*”

# *Incomplete (or absent) threat assessments*

- The operational environment is a contested environment
  - for every acquisition program, there is a threat actor with intent and capability to deny the operational advantage our system provides
- Threat description in the TEMP ensures T&E stakeholders understand the threat
  - use to determine the conditions in which the system is tested and evaluated



If we do not understand the threat by the time we get to OT&E, we are increasing risk to our operators when we deploy the system

# Qualified T&E Managers

- Major acquisition programs, OTAs, and DOT&E should have trained, experienced, and certified T&E Managers
- Agile program T&E managers must be trained in Agile software development
- DOT&E Training Initiatives:
  - Cybersecurity T&E Continuous Learning Module
  - Statistical Test and Analysis Techniques
  - Operational Test Director Course
  - T&E Career Field Track: T&E for Information Technologies



Key to success: a highly skilled acquisition workforce

# Summary

**Our job is to help programs succeed.  
We know where the risks are –  
now go help the program resolve them.**

**Homeland Security Operators  
are counting on us to get it right.**

