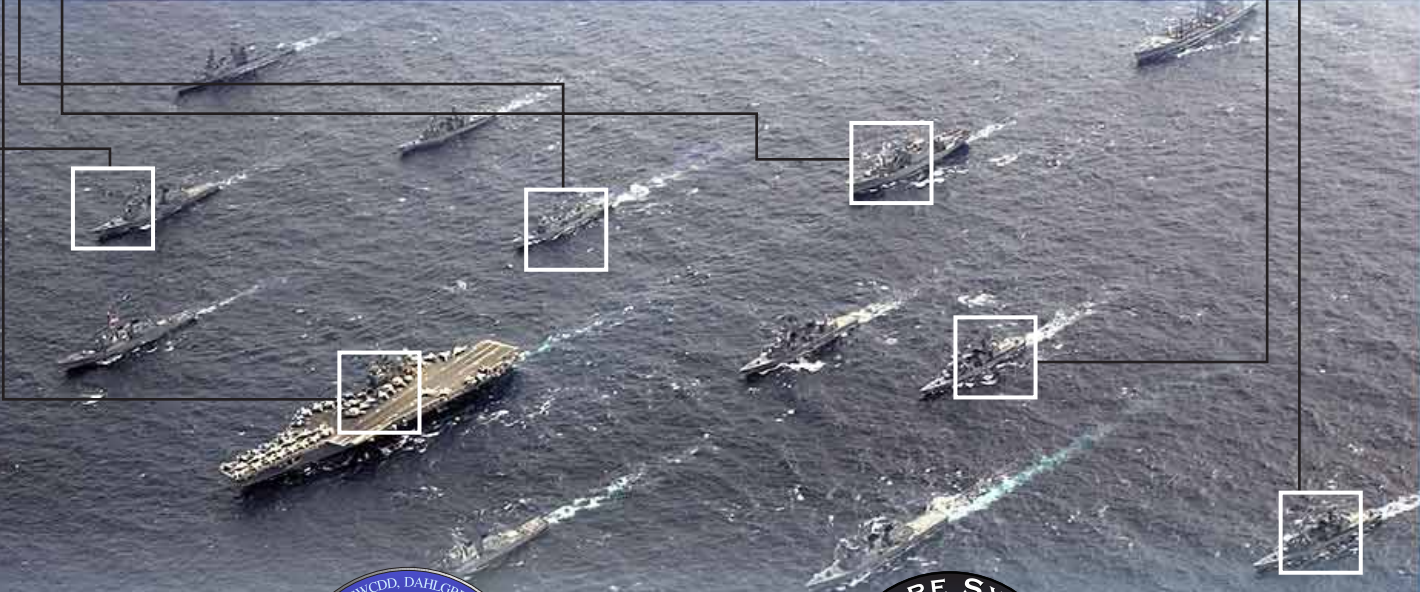




**INTEGRATED COMMAND ENVIRONMENT**  
*"Where the Future Meets the Warfighter"*



NAVAL SEA SYSTEMS COMMAND  
NAVAL SURFACE WARFARE CENTER, DAHLGREN DIVISION  
DAHLGREN      DAM NECK

## Overview – Improving System Performance and Affordability by Improving Sailor Performance

The Naval Surface Warfare Center, Dahlgren Laboratory (NSWCDD) is a leader in providing systems engineering expertise to Navy acquisition programs. The Integrated Command Environment (ICE) and Human Performance Laboratory (HPL) team and facilities, due to the location at NSWCDD and partnership with the Center for Surface Combatant Systems (CSCS), provide a valuable link among science and technology, research and development activities, and the acquisition and fleet communities. Performing research in the context of operational needs ensures fleet interest and participation, appropriate focus, and a clear transition path. Strong fleet participation (1,500 officer and enlisted participants in the last 5 years) and human systems engineering expertise have been key to the success of ICE/HPL. The ICE/HPL team's focus is human performance, stressing optimization of manpower, usability, maintainability, decision support, and knowledge superiority in an effort to enhance the capabilities of our warfighters and improve total system performance and affordability over the entire life cycle of a platform or system. A sound systems engineering approach is applied to problems, emphasizing that a system is not only composed of hardware and software but also includes the human operators, maintainers, decision-makers, and the shore support infrastructure manpower.

### ICE/HPL Efforts

Currently, the ICE/HPL team addresses the following:

- Human performance (Definition of requirements for knowledge superiority, decision support, effective communications, human-computer interaction, manning optimization, maintenance, handling, usability, and training)
- Usability testing of new warfighter-centered designs, decision-support, and workload-reduction concepts
- Experiments on new concepts with fleet teams under realistic conditions to compare individual and team performance with existing systems in the fleet today
- Design of work environments, workstations/consoles, and command spaces; i.e., Naval Space Command, Northern Command, Carrier-Tactical Support Center, DDG 1000 Bridge, and Regional Operations Centers
- Concept demonstrations to help visualize future possibilities and identify critical issues
- Partnership with Naval Air Systems Command, Orlando; CSCS; Human Performance Center; and Virtual Human Systems Integration (HSI) SYSCOM on human performance and training
- Support for the Chief of Naval Operations-initiated Human Systems Performance Assessment Capability (HSPAC), DDG 1000, Littoral Combat Ship, Open Architecture, FORCENet, Missile Defense Agency, Sheriff, and many other programs

Capabilities include measurement of workload and performance across individual, team, system, and organizational domains. ICE/HPL has been instrumental in identifying issues regarding a new way of thinking about shipboard command and control: an integrated command environment that encompasses all command and control capabilities of a platform. Whether this is accomplished in one space, distributed spaces, or in a virtual environment, human capabilities and limitations must be clearly understood to ensure designs are usable, trainable, maintainable, and sustainable under all conditions, ranging from routine to adverse and stressful conditions.

### ICE/HPL Vision

- A human performance test bed
- A vehicle to identify issues and requirements and communicate ideas
- A way to explore the possibilities for an optimally manned command environment

### What ICE/HPL Provides

- Controlled environment for testing
- Flexible and rapidly reconfigurable facility
- Software prototyping expertise
- Simulation capability
- Video, audio, physiological, data recording, and analysis capabilities
- Human factors and margin of error analysis
- Workload assessments, usability studies, and performance tests
- Links to Distributed Engineering Plant; Collaborative Engineering Environment; Human-Centered Design Environment; Naval Air Warfare Center Training Systems Division; Space and Naval Warfare Systems Center, San Diego; Secret Internet Protocol Router Network; Defense Research and Engineering Network; Naval Undersea Warfare Center, and others
- Mobile human performance assessment capability
- Virtual presence capability collaboration and coordination

### What ICE/HPL Facilitates

- Warfighter interaction with designers
- Concept exploration and evaluation
- Efficient requirements definition
- Human factors and technology evaluations
- Manning concept assessments
- Training concept assessments
- Human performance assessment



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