

Coast Guard Research & Development Center

Who we are & what we're doing

By CAPT Al Arsenault, Commanding Officer & Mr. Bert Macesker, Executive Director, CG R&D Center



Let us start this with a few questions to test your general knowledge of the Coast Guard R&D program:

Where is the CG R&D Center located?

- a. Washington, DC
- b. Groton, CT (Avery Point)
- c. Plum Island, NY
- d. New London, CT (Fort Trumbull)

Who does the CG R&D Center report to in the organization?

- a. CG Atlantic Area
- b. Assistant Commandant for Capabilities (CG-7)
- c. Assistant Commandant for Acquisition (CG-9)
- d. Assistant Commandant for Command, Control, Communications, Computers & IT (CG-6)

Answers: 1. (d) 2. (c)

The answers to these questions may seem simple enough, but our guess is that some of you might not know for sure – see answers above. We are the sole facility for conducting Research, Development, Test and Evaluation (RDT&E) for the Coast Guard and have been doing that since 1968 when CG Headquarters recognized the value of emerging technologies and established the Office of R&D. We moved under the jurisdiction of the Coast Guard's Acquisition Directorate (CG-9) in 2007 and moved from Avery Point in Groton, CT to New London in 2009.¹

The Coast Guard Research & Development Center is home to just under 100 Active Duty and Civilian personnel and functions as the tactical arm of the Coast Guard Acquisition Directorate's Research, Development, Test & Evaluation Program. We are a self-sustaining unit with our own Contracting, Support, and Technical Divisions. The Technical Division is broken up into six branches: (1) Command, Control, Communications,

Computers, Intelligence, Surveillance, & Reconnaissance; (2) Aviation; (3) Surface; (4) Environment & Waterways; (5) Acquisition Support & Analysis; and (6) the Modeling & Simulation Center of Expertise.

The R&D Center is truly a unique organic and strategic resource for the Coast Guard and our Federal, Local and State Partners. We have a wide-range of core competencies including experts in every discipline of physical science, engineering, management, operations research, navigation, communications and the environment. The work we do supports the Coast Guard's major missions of maritime mobility, security, safety, defense & protection of natural resources. We are in business to stay abreast of the "state of the art" to help inform leadership decisions, buy down risk for our major acquisition efforts, and enhance mission execution.

The cornerstone of our business is the execution of an annual project portfolio. On any given day, we are executing 80 or so projects. The makeup of this portfolio is driven from strategic, annual, and continuous input. Strategic input comes from our use of Strategic Investment Teams (SITs) that systematically assess potential mission shifts, technology opportunities, and critical capability gaps that are 5 to 20 years out. Our annual input comes from our large group of stakeholders. In March of this year, we tried something new by hosting an Input Submission Review (ISR) to build our FY13 project portfolio. We received more than 100 ideas from CG Headquarters Directorates, the support community and operational commanders. We also work with the Coast Guard Academy to sponsor/mentor Cadet Capstone and Directed Studies projects. Although our funding

will not allow us to pursue every idea, the ISR team was able to rank order the ideas into a more manageable list. The main goal in our Annual Project Cycle is to develop an execution-ready portfolio by October each year.

What we did in FY11

We completed 25 projects and delivered 88 products (technical reports, prototypes, field pilots, briefings). We had many customers, with the greatest share of projects sponsored by CG-5, CG-7, CG-9, and Atlantic Area. We completed many notable studies such as the Offshore Patrol Cutter Alternatives Analysis and Western Rivers Preliminary Fleet Mix Analysis. The Center's High Latitude Study and Polar Icebreaker Business Case Analysis recently went to Congress. We entered into two Cooperative Research and Development Agreements (CRADAs) on energy research with Honda and Mercury Marine to reduce carbon footprint using blended fuels for outboard engines. We successfully completed the Port Resilience Operational/Tactical Enforcement to Counter Terrorism (PROTECT) Pilot in Sector Boston, demonstrating the utility of applying game-theoretic approaches to producing patrol schedules. A more complex test, incorporating multiple threat methods and defender strategies, as input, is underway at Sector NY.

A few other notable projects include: testing of the electro-optical infrared sensor system onboard both HH-65D and HH-60T aircraft to develop sweep width data and new tactics; the use of a prototype Underwater Imaging System (UIS) in multiple operational situations from downed ATON towers to self-propelled semi-submersible (SPSS) recovery; and evaluation of a Remote Aircraft Mover traversing system for the H-65 onboard NSCs to reduce manpower requirements.

The kind of project portfolio we manage requires that we maintain strong scientific and engineering skills. In FY11, staff were recognized as the Innovation Award winner for Deepwater Horizon Response (DHR) Joint Interagency Alternative Technology Assessment Program (IATAP); the EPA 2010 Office

Coast Guard R&D at the Academy

The proximity of the Coast Guard Academy to the R&D Center has facilitated a cooperative professional working relationship. Each year, the R&D Center hosts cadets to expose them to accredited campaign and mission models and to show them how simulation is used in real-world CG applications. We also routinely provide sponsorship/mentorship to cadet projects. Examples include the Parasail Project that looked to cost-effectively improve patrol boat radar surveillance and the use of the commercial iThink simulation tool for readiness management modeling. The R&D Center also provided the Naval Architecture/Marine Engineering Department with new scale models of the National Security Cutter and Fast Response Cutter for cadet tow tank studies.

Most recently, we shared the list of Fiscal Year 2013 project ideas that came from all over the Coast Guard (100 new ideas were submitted at this year's Idea Submission Review) and identified those that would be good candidates for Capstone, Directed Studies, potential faculty/graduate student summer research projects, and even Fulbright scholarships. Attending senior cadet project presentations is particularly beneficial to R&D Center scientists & engineers in that, they often re-awaken innovative thinking after listening to the creative solutions offered by the cadets.

of R&D Honor Award for development of ballast water treatment verification protocol; and the David Meister Award for integration of human performance modeling with mission simulation.

What we are doing in FY12 and beyond

Our most significant RDT&E investment in FY12 is in unmanned aerial system (UAS) technology and includes 1) demonstrating a small UAS (sUAS) capability off a flight deck equipped cutter and 2) procuring long lead time materials (LLTM) for demonstrating a more capable vertical UAS (VUAS) capability. A future CG operating CONOP may include UAS as part of its cutter fleet to provide them additional tools in support of the surveillance, detection, classification, identification and prosecution of targets of interest.

We have initiated new CRADAs with industry including several with a C4IT-focus towards improving infrastructure resiliency. They include federal integrated communications, mobile asset tracking, and alternative wireless timing technology investigations. We've



STRAITS OF MACKINAC - Crewmembers aboard the Coast Guard Cutter Hollyhock, homeported in Port Huron, Mich., use an oil-skimming device to recover peat moss, acting as a substitute for spilled oil, near Mackinac Island, Jan. 24, 2012. The crew of the Hollyhock is participating in a project led by the Coast Guard's Research and Development Center, showcasing techniques for removing spilled oil from a frozen environment. U.S. Coast Guard photo by Petty Officer 1st Class Matthew Schofield.

found that CRADAs are a great way to work with industry when there is shared interest in technology development.

Arctic R&D investments also continue to be our focus in FY12 and include research into new Arctic craft with planned FY13 District 17 summer test deployments, new anti-icing capabilities, response to oil-in-ice research (can our recovery systems be used in ice filled waters, will in-situ burns be effective in sub-zero temperatures, etc.), development of lateral range curves and new sweep width planning tables for search objects on ice, and creation of new modeling and simulation environments to address resource, activity, and Arctic operation risk questions. These R&D investments are complemented by Operating Expense funded efforts that include the development of a replacement iceberg prediction system for the International Ice Patrol and characterizing the performance gaps in higher latitude high frequency and satellite communications.

C4ISR R&D focus and investments are growing in FY12 in response to the CG's aggressive pursuit of new C4ISR capabilities for its assets and commanders. Accomplishing this requires that we understand the requirements and capabilities we really need for mission success and any new analytic capabilities we might need to help us measure the enabling factors

for realizing net-centric operating environments for assigned forces and first responders.

We are conducting several follow-up projects to DHR with investments in the detection and collection of oil in the water column and recovery of heavy oil. We have also reached a cross road in several years of our research behind new standards to reduce invasive species risk in terms of ballast water treatment (BWT).

In Summary

Working at the R&D Center is truly a unique and rewarding experience. Technology is changing rapidly. There will be more change in the next three years than in the previous 25. Access to inner and outer space, 'big data,' and sensing technology are becoming more and more affordable. The Center is ready for the future...go ahead, send us your problems and ideas!

1. *The Center is located adjacent to historic Fort Trumbull – a fortification built at the Port of New London to protect the seat of government of CT. During the American Revolutionary War, the fort was attacked and captured by British forces under the command of Benedict Arnold. In the early 1900s, the stone buildings around Fort Trumbull served as the original CG Academy.*

Captain Al Arsenaault is a 1988 Electrical Engineering Graduate of CGA and earned a Master of Science in Electrical Engineering from the University of New Hampshire in 1994. Following his first afloat tour after graduation, he has served ashore focusing on Loran-C engineering, Electronics Maintenance, and Major Acquisitions. He became the Commanding Officer of the R&D Center in June 2011.

Mr. Bert Macesker holds a Bachelors in Ocean Engineering from Florida Atlantic University and Masters in Engineering from the University of Connecticut. He has 20 years of maritime technology development and project management experience and became the RDC Executive Director in May 2011.