



Acquisition Directorate
Research, Development, Test & Evaluation

U.S. Coast Guard FY21 RDT&E Project Portfolio



UNCLAS | FY21 RDT&E Project Portfolio
CG-926 RDC | A. Arsenault | October 2020

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Table of Contents | FY21 RDT&E Project Portfolio

Branch Area	Project #	Project	Status	Slide #
Aviation	7619	Autonomous Surface-Search Sensor for Manned Aircraft		4
	7937	Incorporating Sensor Performance in SAROPS		5
	7821	Airborne Counter Unmanned Aircraft Systems (C-UAS)		6
	2021-02	Advanced Maritime Counter-Unmanned Aircraft System (C-UAS) Technologies		7
	7691	Beyond Visual Line of Sight (BVLOS) Technology for Coast Guard (CG) Unmanned Aircraft System (UAS) Operations		8
C5I (Command, Control, Communications, Computers, Cyber, & Intelligence)	8120	Redefine Field Intelligence Reporting and Analysis		9
	8502	Cybersecurity Vulnerabilities, Threats, and Risk Mitigation Strategies for Coast Guard Surface and Air Assets		10
	7812	Maritime Counter Unmanned Aircraft Systems (C-UAS)		11
	2021-01	Modernizing Law Enforcement Encounter Background Checks at Sea		12
	2021-04	Mission-Specific Long-Range Communication Analysis		13
	2020-20	High Frequency (HF) Radar		14
E&W (Environment & Waterways)	1008	Survival Modeling, Reporting, and Statistics		15
	4711	Advancing UAS and AUV Capabilities to Characterize Water Column and Surface Oil in Ice Environments <i>(Oil Spill Liability Trust Fund funding)</i>		16
	47041	In-Situ Oil Burn (ISB) Research <i>(Oil Spill Liability Trust Fund & Great Lakes Restoration Initiative funding)</i>		17
	1205	Mass Rescue Life Saving Appliance (MRLSA)		18
	2021-20	Behavior of Diluted Bitumen (Dilbit) in Fresh Water <i>(Oil Spill Liability Trust Fund & Great Lakes Restoration Initiative funding)</i>		19
	4710	Nearshore and Inland Evaluation of the Estimated Recovery System Potential (ERSP) Calculator <i>(Oil Spill Liability Trust Fund funding)</i>		20
	2703	Next Generation Aids to Navigation Buoys & Alternative Moorings		21
	4135	Ballast Water Management (BWM) Research and Development <i>(Great Lakes Restoration Initiative funding)</i>		22



Table of Contents | FY21 RDT&E Project Portfolio

Branch Area	Project #	Project	Status	Slide #
ITNET (IT & Networks)	8702	Evaluate Network Accelerator Technology to Improve Cutter Information Technology (IT) Performance		23
	8701	Automatic Identification System (AIS) Cyber Security		24
	8503	Radio Frequency (RF) Communications in a Cloud Environment		25
	8107	Extended Reality (XR) Capabilities for Coast Guard Mission Support		26
	2021-08	Operational Mobile Technology Architecture		27
	2021-03	High Latitude Underway Connectivity		28
	8703	Evaluation and Testing of VHF Data Exchange System (VDES) Impacts on the Automatic Identification System (AIS)		29
MSA (Modeling, Simulation, & Analysis)	7529	Research into Navigational Safety Risk Modeling and Analysis Tool		30
	7401	Machine Learning Platforms to Improve Coast Guard Tools		31
	9204	Condition-Based Maintenance (CBM) for Coast Guard Asset Product Lines		32
	2021-15	Applications of Robotic Process Automation		33
	7820	Maritime Unmanned System Technology (MUST)		34
Surface	62102	Arctic Technology Evaluation 2019 - 2020		35
	7210	Low-Cost MDA Pilot (<i>Legislative Requirement</i>)		36
	5507	Bromine-Free Water Purification Systems (<i>Legislative Requirement</i>)		37
	5922	Counter Unmanned Underwater Vehicle (C-UUV)/Anti-Swimmer Technology		38
	5807	Drug and Explosives Detection Technologies		39
	2021-11	Cold Spray Restoration of Vessel and Aircraft Components		40
	2021-16	Enhanced Rotary Wing Night Vision Goggle (NVG) Searches		41
	62103	Polar Regions Technology Evaluation 2021 - 2022		42
STIC (Science & Technology Innovation Center)	99953	FY21 Science & Technology Innovation Center (CG-STIC) Tasks <i>(U.S. Department of Homeland Security Science and Technology Directorate funding)</i>		43
Misc.	N/A	FY21 Short Term Analytical Support Efforts		44



Mission Need: Greater efficiency and effectiveness of searches conducted by airborne assets.

Objectives

- Update market research on autonomous sensor systems for maritime search.
- Determine the potential for autonomous surface-search sensor integration on U.S. Coast Guard (CG) rotary wing assets.
- Expand the CG’s existing autonomous sensor performance data set.
- Model the impact of executing search missions with an autonomous sensor package.



Notes

- This project builds on autonomous sensor research for unmanned aircraft executed under CG Research and Development Center Project 7810: Advanced Small Unmanned Aircraft System Sensor Investigations.

Sponsor: CG-711 **Stakeholder(s):** CG-41, CG-SAR, CG-931

RDC Research Lead: Mr. Evan Gross **CG-926 Domain Lead:** Mr. Scott Craig

Anticipated Transition: Knowledge Product
Future Technology

Project Timeline / Key Milestones

Project Start: 1 Oct 19	
Autonomous Sensor Technology Update	18 May 20 ✓
Autonomous Surface-search Sensor Performance Data Update	16 Jun 20 ✓
Integration Hardware/Software Engineering Complete	Aug 20
Mission Performance Modeling Complete	Aug 20
Autonomous Surface Search Sensor for CG Rotary Wing Assets (Report)	Dec 20 ★
Project Completion: Dec 20	



Mission Need: Time and cost effective methodology to incorporate sensor capabilities in SAROPS.

Objectives

- Determine sensitivity of the Search and Rescue Optimal Planning System (SAROPS) search metrics to inputs.
- Identify a resource-effective approach to develop the sensor-specific data required for use in SAROPS.
- Create a prototype of this new approach for developing the sensor-specific data.



Notes

- Leverages U.S. Coast Guard Research and Development Center’s previous work with developing SAROPS sensor inputs.

Sponsor: CG-SAR

Stakeholder(s): LANT, PAC, FORCECOM, D1, D7, D9, D11, D13, Boat Forces

RDC Research Lead:
Ms. Grace Python

CG-926 Domain Lead:
Mr. Scott Craig

Anticipated Transition: Knowledge Product
Influence Tactics, Techniques, & Procedures

Project Timeline / Key Milestones	Project Start: 2 Oct 17	
	Completion of Work Under Original Project Scope	13 Mar 19 ✓
	Project Re-scoped and Retitled	11 Jul 19 ✓
	Required SAROPS Input to Develop Sweep Width Brief	15 Dec 19 ✓ ★
	Key Decision Point	16 Dec 19 ✓
	Sensitivity Analysis & Underlying Assumption Investigation Complete	Dec 20
	SAROPS Sensitivity Analysis (Brief)	Jan 21 ★
	Methods to Develop Sensor-Specific Data Research Complete	Apr 21
	Incorporating Sensor Performance in SAROPS (Brief)	Jun 21 ★
	Prototype Tool for Incorporating Sensor Performance in SAROPS (Prototype)	Dec 21 ★
Incorporating Sensor Performance in SAROPS (Report)	Feb 22 ★	
Project Completion: Feb 22		



Mission Need: Technology and tactics to secure airspace from small Unmanned Aircraft Systems (sUAS).

Objectives

- Characterize the aviation mission for countering sUAS threats.
- Benchmark ground-based C-UAS solutions and determine the potential for transition to airborne platforms.
- Investigate robust airborne detection, tracking, classification, and identification technologies for airborne assets.
 - Generate a prototype Technical Data Package (TDP) for an airborne C-UAS system.
 - Fabricate and integrate a minimally invasive C-UAS demonstration prototype.
- Conduct prototype test and evaluation to assess functional characteristics.



Notes

- This effort will leverage partnerships with the U.S. Department of Homeland Security Science and Technology Directorate, Air Force Research Laboratory, Naval Air Systems Command, and other government organizations.

Sponsor: CG-711 **Stakeholder(s):** CG-41, CG-711, CG-26, CG-68, CG-5R, ALC

RDC Research Lead: C-UAS Research Team **CG-926 Domain Lead:** C-UAS Research Team

Anticipated Transition: Knowledge Product
Future Technology

Project Start:

Project Timeline / Key Milestones

Please e-mail RDC-Info@uscg.mil for information concerning the Milestones and Deliverable Schedule.

Project Completion:



Advanced Maritime Counter-Unmanned Aircraft System (C-UAS) Technologies

2021-02

Mission Need: Operationally effective C-UAS force protection capability.

Objectives

- Assess new developments in kinetic C-UAS solutions in the open market and with other government agencies as technologies mature.
- Automate object detection and classification based on Electro-Optical/Infrared camera data by collaborating with optics companies to incorporate additional sensor modalities to aid UAS detection and target discrimination.
- Explore applicability of data fusion algorithms and machine learning to combine multiple data types into single threat track to reduce operator workload, uncertainty, and response time.
- Provide technical guidance on system employment for various mission sets based on legal authority and tactics, techniques, and procedures.



Notes

- Follow-on for CG Research and Development Center (RDC) Project 7812: Maritime Counter Unmanned Aircraft Systems (ending Feb 2021).
- Potential for shared work with CG RDC Project 7821: Airborne Counter Unmanned Aircraft Systems.
- Continue partnership with Office of Naval Research (ONR), Air Force Research Laboratory (AFRL), and Naval Surface Warfare Center (NSWC).

Project Timeline / Key Milestones

Project Start:

Please e-mail RDC-Info@uscg.mil for information concerning the Milestones and Deliverable Schedule.

Project Completion:

Sponsor: CG-MSR

Stakeholder(s): CG-711, CG-721, CG-751, LANT-3, PAC, D1, NSWC Dahlgren, AFRL, ONR

RDC Research Lead:
C-UAS Research Team

CG-926 Domain Lead:
C-UAS Research Team

Anticipated Transition: Product
Fielded Prototype



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October 2020 7

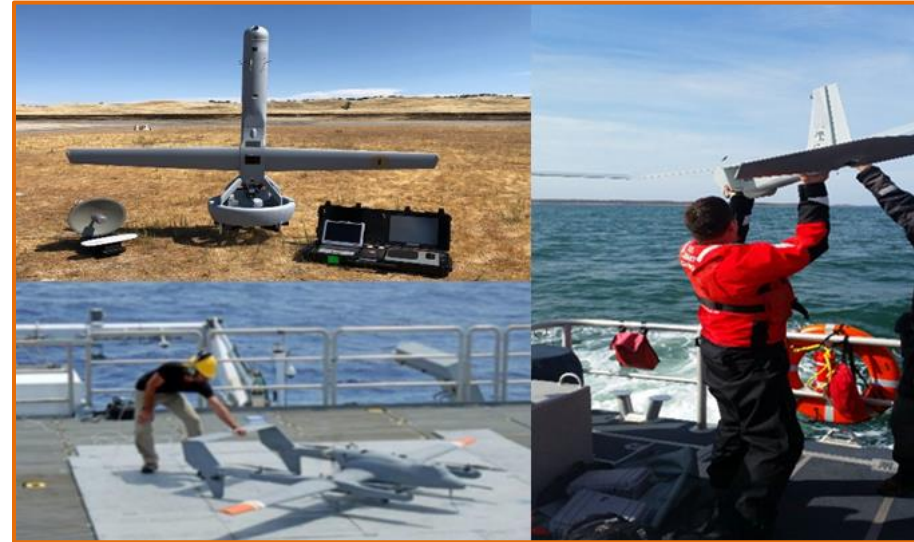
Beyond Visual Line of Sight (BVLOS) Technology for Coast Guard (CG) Unmanned Aircraft System (UAS) Operations

7691

Mission Need: BVLOS operations for CG UAS.

Objectives

- Leverage U.S. Southern Command (SOUTHCOM), Joint Inter Agency Task Force-South (JIATF-S), and Navy Research Laboratory (NRL) efforts to explore Vertical Takeoff and Landing (VTOL) operations from a CG Cutter (CGC).
- Integrate DAA technologies for conducting BVLOS operations [sUAS 1st].
- Conduct land and vessel based evaluations using DAA technology [sUAS 1st].
- Conduct a VTOL BVLOS Limited User Evaluation from a CGC.
- Inform due regard parameters for CG BVLOS UAS operations.
- Establish a BVLOS Certificate of Authorization for Coast Guard operations.
- Conduct a land based MR-UAS Search and Rescue (SAR) demonstration.



Notes

- Establish Memoranda of Understanding and Cooperative Research and Development Agreements as necessary with industry partners.
- Leverage efforts of SOUTHCOM, Federal Aviation Administration, National Oceanic and Atmospheric Administration, JIATF-S, and other government agencies.

Sponsor: CG-711

Stakeholder(s): CG-751, CG-931, SOUTHCOM, JIATF-S, NRL

RDC Research Lead:
Mr. Stephen Dunn

CG-926 Domain Lead:
Mr. Scott Craig

Anticipated Transition: Knowledge Product
Acquisition Milestone Support

Project Timeline / Key Milestones

Project Start: 13 Mar 19

Establish Evaluation Team for DAA Technologies	28 Oct 19	✓
Submit for BVLOS Technologies	15 Jan 20	✓
Coordinate VTOL Demonstrations from a CGC Complete	Aug 20	
VTOL Operations from a CGC (Brief)	Nov 20	★
BVLOS Technologies Integrated into sUAS	Apr 21	
Land Based BVLOS Tech Demo with sUAS Complete	Jul 21	
Vessel Based BVLOS Tech Demo with sUAS Complete	Jan 22	
Land and Vessel Based BVLOS Demonstrations (Brief)	Mar 22	★
BVLOS Technology VTOL UAS Integration Complete	Aug 22	
BVLOS VTOL SAR Limited User Evaluation Complete	Nov 22	
Beyond Visual Line of Sight UAS Operations (Report)	Mar 23	★

Project Completion: Mar 23



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October 2020 8

Redefine Field Intelligence Reporting and Analysis

8120

Mission Need: Improved information dominance in the maritime domain.

Objectives

- Automate analysis of field intelligence reports by leveraging cutting edge human language tools, artificial intelligence, machine learning and other analytical tools.
- Enable shorter feedback loops with relevant, timely, and predictive intelligence for CG decision makers by utilizing government cloud technology.



Notes

- Partner with the Federal Bureau of Investigation, the U.S. Department of Defense, U.S. Department of Homeland Security Office of Intelligence and Analysis, Office of the Director of National Intelligence, and U.S. Immigrations and Customs Enforcement Homeland Security Investigations.

Sponsor: CG-25 **Stakeholder(s):** CG-26, CG-68, CG-5R, CG-CYBER, CG-761, CG-CI, CG-CGIS, ICC, MIFCPAC, MIFCLANT

RDC Research Lead: LT Anne Newton **CG-926 Domain Lead:** Ms. Holly Wendelin

Anticipated Transition: Product
Pending Acquisition

Project Timeline / Key Milestones

Project Start: 1 Oct 19	
Field Collector Summit Complete	22 Jan 20 ✓
Intelligence Collection Unit Visits Complete	5 Mar 20 ✓
Research Functional Characteristics and Processes	27 Mar 20 ✓
Complete Prototype	31 May 20 ✓
Limited User Evaluation Complete	Sep 20
Redefine Field Intelligence Reporting and Analysis (Report & Brief)	Dec 20 ★
Project Completion: Dec 20	



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October 2020 9

Cybersecurity Vulnerabilities, Threats, and Risk Mitigation Strategies for Coast Guard Surface and Air Assets

8502

Mission Need: U.S. Coast Guard (CG) platforms require resistance and resilience to cyber attacks.

Objectives

- Conduct cyber security risk research analysis for Global Positioning System (GPS), Automatic Identification System (AIS) and specific mission oriented systems dependent on position, navigation and timing.
- Perform a cyber assessment on a CG asset to identify vulnerabilities, threats and risk mitigation strategies.
- Develop and test a cyber risk mitigation solution that could be used to recover compromised operational technology systems on CG surface and air assets.



Notes

- Leverage research and development efforts of the Office of Naval Research's Resilient Hull, Infrastructure, Mechanical, and Electrical Security program; Federally Funded Research and Development Centers; and University Affiliated Research Centers.
- Partner with Johns Hopkins University Applied Physics Lab on U.S. Navy Sea Change initiatives and cyber risk mitigation.

Sponsor: CG-791

Stakeholder(s): CG-761, CG-711, CG-751, CG-933, C5ISC, CYBERCOM

RDC Research Lead:
Mr. Robert Taylor

CG-926 Domain Lead:
Ms. Holly Wendelin

Anticipated Transition: Knowledge Product
Influence Tactics, Techniques, & Procedures

Project Timeline / Key Milestones

Project Start: 3 Oct 16	
Inventory and Acquire GPS/AIS Units Complete	22 Dec 16 ✓
GPS/AIS Testing Complete	22 Jul 17 ✓
Inventory of Surface Systems for Evaluation Complete	26 Oct 17 ✓
GPS/AIS Cyber Assessment (Report)	22 Feb 18 ✓ ★
Surface Asset Assessment Complete	5 Apr 18 ✓
Cyber Risk Mitigation Systems Research Complete	31 Oct 18 ✓
CG Surface Asset for Cyber Risk Mitigation Selected	18 Dec 19 ✓
Cyber Risk Mitigation Strategy in Lab Environment Complete	29 Jun 20 ✓
Cyber Risk Mitigation Demonstration on CGC Complete	Sep 20
Cybersecurity for Coast Guard Surface and Air Assets (Report & Brief)	Feb 21 ★
Project Completion: Feb 21	



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October 2020 10

Mission Need: Detect, track, identify, and defeat illicit use of UAS in the maritime environment.

Objectives

- Inform requirements for C-UAS for the U.S. Coast Guard (CG) Ports, Waterways, and Coastal Security (PWCS) and Defense Readiness missions.
- Establish functional characteristics by evaluating system prototypes in an operational maritime environment
- Integrate successful systems to build an end-to-end layered defensive system prototype, aimed at increasing performance and usability while reducing size, weight and power and manning requirements.
- Provide C-UAS system subject matter expertise in development of tactics, techniques, and procedures for CONUS and OCONUS applications.



Notes

- This effort leverages partnerships with the U.S. Department of Homeland Security (DHS) Science and Technology Directorate (S&T), Defense Advanced Research Projects Agency (DARPA), Air Force Research Laboratory, Naval Surface Warfare Centers, the Office of Naval Research, and other government organizations.

Project Timeline / Key Milestones

Project Start:

Please e-mail RDC-Info@uscg.mil for information concerning the Milestones and Deliverable Schedule.

Project Completion:

Sponsor: CG-MSR

Stakeholder(s): CG-711/731/721/751/2/6, DCMS-34, C5ISC, SFLC, AREA-3, DARPA, DHS S&T

RDC Research Lead:
C-UAS Research Team

CG-926 Domain Lead:
C-UAS Research Team

Anticipated Transition: Product
Fielded Prototype



Modernizing Law Enforcement Encounter Background Checks at Sea

2021-01

Mission Need: Real-time, relevant information to the boarding team.

Objectives

- Improve the current process for Law Enforcement personnel to enable faster and more accurate results delivered on-scene directly to the Boarding Officer by building and deploying a prototype in the field to be evaluated by Boarding Officers and Intelligence Coordination Center (ICC) Coastwatch experts.
- Create new targeting rule sets in partnership with ICC Coastwatch to enable automation of substantive results in near real time.

Notes

- Partner with the National Urban Security Technology Laboratory, U.S. Department of Homeland Security Criminal Investigation and Network Analysis Center of Excellence, Transportation Security Administration, and Connecticut State Police to explore technologies being used.



Project Timeline / Key Milestones

Project Start: Oct 20	
Market Research Complete	Dec 20
Modernizing Law Enforcement Encounter Background Checks at Sea (Brief)	Jan 21 ★
New ICC Targeting Rule Sets Complete	Mar 21
Prototype Complete	Aug 21
Limited User Evaluation Complete	Sep 21
Modernizing Law Enforcement Encounter Background Checks at Sea (Report)	Feb 22 ★
Project Completion: Feb 22	

Sponsor: CG-MLE

Stakeholder(s): CG-26, CG-25, ICC, CG-MLE, CG-721, CG-761, C5ISC, LANT/PAC-6

RDC Research Lead:
LT Anne Newton

CG-926 Domain Lead:
Ms. Holly Wendelin

Anticipated Transition: Knowledge Product
Influence Tactics, Techniques, & Procedures



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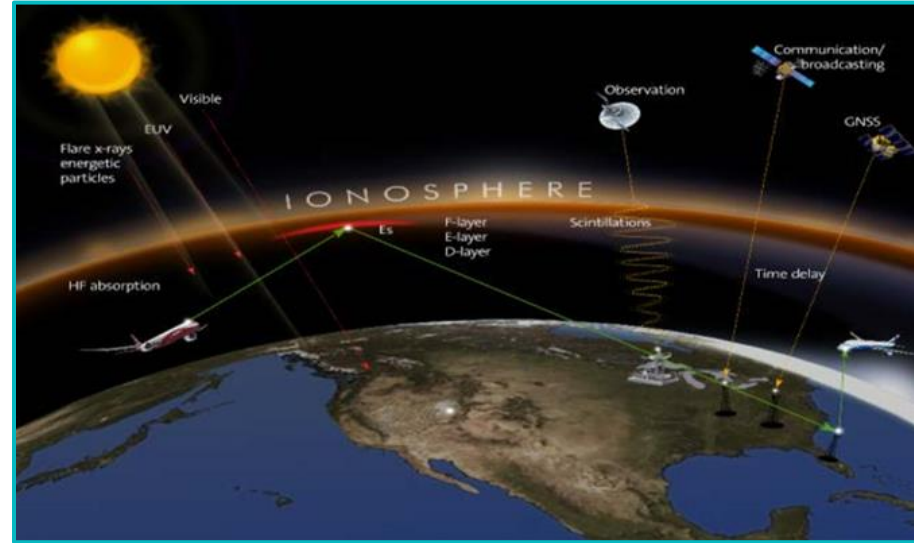
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October 2020 12

Mission Need: Long-range communication options ranked for each mission set and environment.

Objectives

- Identify baseline, new, and emerging long-range communications options to include technologies such as:
 - Low, medium, and High Frequency (HF).
 - Satellite communications.
 - 3G/4G/5G automatic link establishment.
- Develop a comprehensive matrix assessing those technologies for applicability by mission or geographic area including technical performance and resource burden.
- Conduct testing or demonstration of the most relevant technologies and assess value added compared to baseline capability.



Notes

- Leverage CG-761-developed Capabilities Based Assessment on current state of U.S. Coast Guard long-range communications.
- Partner with Naval Postgraduate School on a proposed thesis analyzing (1) Digital Radio Mondiale as an HF communications capability with encryption requirements, and (2) a new HF Internet Protocol under development.
- Collaborate with U.S. Naval Forces Southern Command (SOUTHCOM), USN 4th Fleet, Joint Interagency Task Force-South (JIATF-S), and leverage experimentation work by U.S. Department of Defense research laboratories.

Sponsor: CG-761

Stakeholder(s): CG-68/751/791, C5ISC, CGCYBER, JIATF-S, LANT/PAC-6, SOUTH/FORCE/COMMCOM, ALC

RDC Research Lead:
Mr. Robert Taylor

CG-926 Domain Lead:
Ms. Holly Wendelin

Anticipated Transition: Knowledge Product
Influence Tactics, Techniques, & Procedures

Project Timeline / Key Milestones

Project Start: Oct 20	
Long-Range Communications Options Identified	Mar 21
Sponsor Briefed on Long-Range Communications Options	Mar 21
Long-Range Communications Matrix Complete	May 21
Mission-Specific Long-Range Communications Analysis (Brief)	Jun 21 ★
Technology Demonstration Complete	Dec 21
Mission-Specific Long-Range Communications Analysis (Report)	Mar 22 ★
Project Completion: Mar 22	



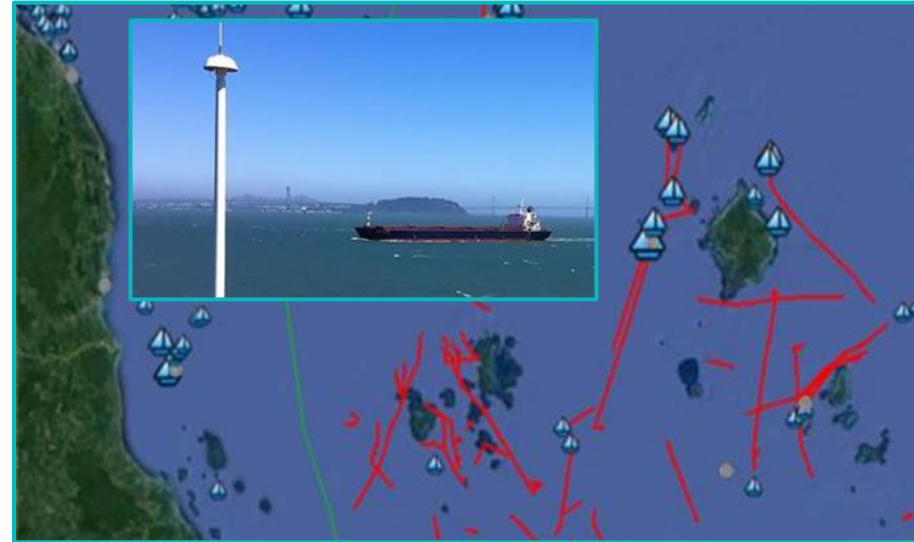
High Frequency (HF) Radar

2020-20

Mission Need: Enhance Maritime Domain Awareness (MDA) in the U.S. Exclusive Economic Zone (EEZ).

Objectives

- Assess High Frequency Surface Wave Radar (HFSWR) tracking and communications capabilities of existing systems with government and commercial partners.
- Evaluate HFSWR applicability to CG missions through a technology demonstration with partner organizations at an established site.
- Investigate the data fusion analysis framework for possible CG integration and transition with the Maritime Intelligence Fusion Centers (MIFC).
- Identify the locations with greatest utility and return on investment for potential fielding of HFSWR to enhance MDA within the EEZ.



Notes

- Partnership opportunities include the National Oceanic and Atmospheric Administration, Naval Postgraduate School, the U.S. Department of Homeland Security (DHS) Science and Technology Directorate (S&T) - Borders, Immigration, and Maritime (BIM), Naval Research Laboratory, U.S. Southern Command (SOUTHCOM), Joint Interagency Task Force-South (JIATF-S), and the Commander, USN 4th Fleet Science Advisor.

Sponsor: CG-761

Stakeholder(s): MIFC, CG-26/68/741/933, C5ISC, LANT/PAC-6, DHS S&T BIM, SOUTHCOM, JIATF-S

RDC Research Lead:
Ms. Amy Cutting

CG-926 Domain Lead:
Ms. Holly Wendelin

Anticipated Transition: Knowledge Product
Future Technology

Project Timeline / Key Milestones

Project Start: Oct 20	
Delivered Assessment of Current HFSWR Capabilities	Mar 21
High Frequency Surface Wave Radar Capabilities (Brief)	Apr 21 ★
Technology Demonstration Completed	Sep 21
Investigated Applicability to CG Missions	Mar 22
High Frequency Surface Wave Radar for CG Operations (Report & Brief)	Jun 22 ★
Project Completion: Jun 22	



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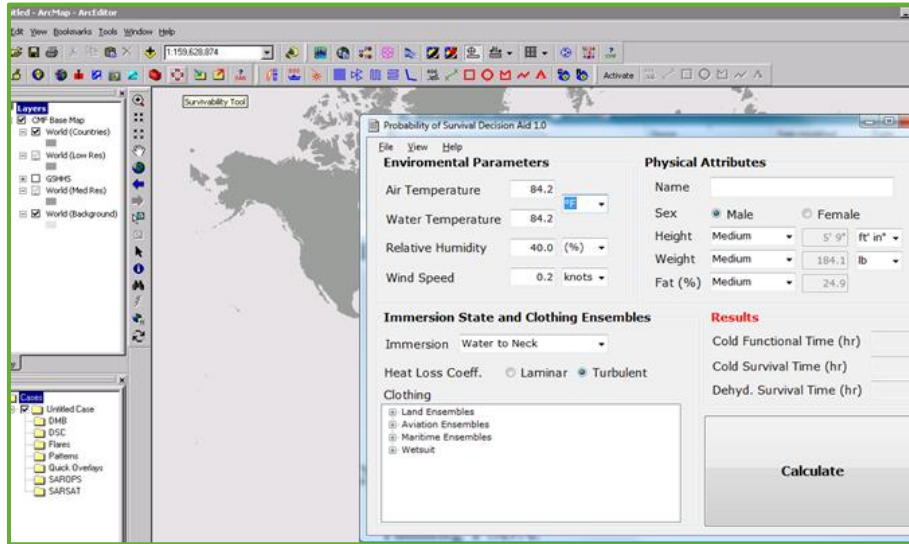


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October 2020 14

Mission Need: Improve SAROPS utility by incorporating better survival modeling and statistics.

- Objectives**
- Improve Search and Rescue survival decision tools by incorporating methods that better account for survival time in warmer water (15°C (59°F)) and incorporating survival factors beyond heat production and heat loss.
 - Develop a dynamic database to validate model(s) against statistics, and permit model fine-tuning as the database grows.
 - Provide the Search and Rescue program an easily-integrated survival module that allows two-way compatibility with existing Search and Rescue Optimal Planning System (SAROPS) processes.



- Notes**
- Carries forward U.S. Coast Guard (CG) Research and Development Center survival-related work with U.S. Department of Defense labs (John Hopkins University/Applied Physics Lab).
 - Explore partnerships with National Labs and University Centers.

Sponsor: CG-SAR **Stakeholder(s):** CG-5R, CG-761, C5ISC

RDC Research Lead: Ms. Monica Cisternelli **CG-926 Domain Lead:** Ms. Karin Messenger

Anticipated Transition: Knowledge Product
Influence Tactics, Techniques, & Procedures

Project Start: 1 Nov 17

Project Timeline / Key Milestones	Investigated Requirements and Applications	30 Apr 18	✓
	Investigated State of Survival Models	6 Jul 19	✓
	Conducted Facilitated Workshop	28 Aug 19	✓
	Survival Statistics Brief Complete	16 Dec 19	✓
	Survival Information Data Collection Complete	Sep 20	
	Key Decision Point to Progress to Model Implementation and Validation	Sep 20	
	Enhanced CG Survival Model and Implementation – Phase I (Brief)	Nov 20	★
	Adapt Model with Prioritized Survival Factors Complete	Jun 21	
	Survival Model Validated	Jul 21	
	Enhanced CG Survival Model and Implementation Guidance (Report)	Sep 21	★

Project Completion: Sep 21

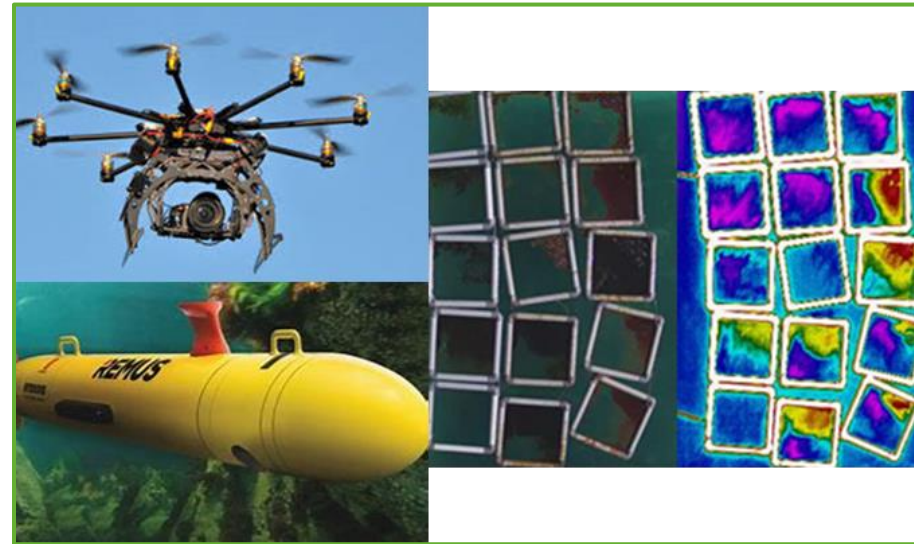
Advancing UAS and AUV Capabilities to Characterize Water Column and Surface Oil in Ice Environments

4711

Mission Need: Technologies to detect and characterize oil spills in ice environments.

Objectives

- Coordinate and conduct multi-agency lab and field tests to gain better understanding of aerial and underwater sensor capability in characterizing oil on the surface or in the water column in ice conditions.
- Determine remote vehicle telemetry capability to transfer sensor data to on-scene responders or Incident Command as actionable information.



Notes

- Oil Spill Liability Trust Fund funding.
- Partnerships with Cold Regions Research and Engineering Laboratory (CRREL), Woods Hole Oceanographic Institute (WHOI), U.S. Department of Homeland Security (DHS) Science and Technology Directorate (S&T) Office of University Programs (OUP), National Oceanic and Atmospheric Administration, Bureau of Safety and Environmental Enforcement, and U.S. Environmental Protection Agency.

Sponsor: CG-MER **Stakeholder(s):** CG-5RI, D1, D9, D17, ADAC, NOAA OR&R, WHOI, MBARI, DHS S&T OUP

RDC Research Lead: Mr. Alexander Balsley, P.E. **CG-926 Domain Lead:** Ms. Karin Messenger

Anticipated Transition: Product
Fielded Prototype

Project Timeline / Key Milestones

Project Start: 23 Jan 20		
Interagency Reimbursable Work Agreement with NOAA Complete	3 Jun 20	✓
Phase 1: Unmanned Aircraft System (UAS)/Autonomous Underwater Vehicle (AUV) Tests at CRREL Complete	Nov 20	
Laboratory Results and Way Ahead (Brief)	Jan 21	★
Field Exercise Planning Complete	Feb 21	
UAS/AUV Lab Experiments Results (Report)	Mar 21	★
Phase 2: UAS/AUV Systems Field Testing in Great Lakes or Arctic Complete	Feb 21	
Data Schema for Data Stream Export Complete	May 21	
UAS/AUV Systems Field Exercise Integration (Report)	Sep 21	★
Project Completion: Sep 21		

Mission Need: Improve ISB knowledge base to supplement oil spill response options.

Objectives

- Evaluate best practices for operational use of ISB in multiple environments, including fresh water and areas with vegetation.
- Develop methods to conduct ISB smoke-plume monitoring that improve sampling accuracy and responder safety.
- Provide reference guidance for Federal On Scene Coordinator and Regional Response Team use.



Notes

- Multiple funding sources including Oil Spill Liability Trust Fund and Great Lakes Restoration Initiative.
- Partner with academia and national labs to ensure result visibility and access.

Sponsor: EPA Great Lakes Nat'l Program Office, CG-MER

Stakeholder(s): CG-721, NSF, EPA, BSEE, D9, RRT5

RDC Research Lead:
LT Liz Murphy

CG-926 Domain Lead:
Ms. Karin Messenger

Anticipated Transition: Knowledge Product
Influence Tactics, Techniques, & Procedures

Project Timeline / Key Milestones

Project Start: 1 Oct 18	
Mesoscale Freshwater Burns Complete	19 Jul 19 ✓
Large-scale Freshwater Burns Complete	25 Oct 19 ✓
Remote Air Monitoring Market Research Complete	Aug 20
Freshwater In-Situ Burn (Report)	Aug 20 ★
Remote Air Monitoring Process Framework Complete	Oct 20
Test Plan for Remote Air Monitoring Complete	Jan 21
Air Monitoring During ISB – Event 1 Complete	Mar 21
Air Monitoring During ISB – Event 2 Complete	Jul 21
Remote Air Monitoring Technology Evaluation (Report)	Feb 22 ★
Project Completion: Feb 22	



Mass Rescue Lifesaving Appliance (MRLSA)

1205

Mission Need: Lightweight, easy to use, temporary, mass rescue survivor platform.

Objectives

- Find, promote, or develop the technology to manufacture an extremely compact, lightweight, rescue intervention device to safely keep 100+ persons out of the water for up to 24 hours.
- Transition the developmental result to the Office of Search and Rescue and capability stakeholders for implementation as a mass rescue tool.



Notes

- Partnership with Air Force Research Laboratory.
- Investigate National Aeronautics and Space Administration or other government agency partnership.
- Department of Homeland Security (DHS) Science & Technology (S&T) funded Broad Agency Announcement for prototype development.

Project Timeline / Key Milestones

Project Start: 1 Oct 19	
Request for Information/Technology Assessment Complete	1 Mar 20 ✓
MRLSA: Market Research Summary (Report)	13 May 20 ✓ ★
Interim Brief Complete	April 21
Prototype Development Complete	Oct 21
Prototype Evaluation Complete	Nov 21
Mass Rescue Lifesaving Appliance (Report)	Mar 22 ★
Project Completion: Mar 22	

Sponsor: CG-SAR **Stakeholder(s):** DHS S&T, CG-711, CG-731, CG-751

RDC Research Lead: Ms. Monica Cisternelli **CG-926 Domain Lead:** Ms. Karin Messenger

Anticipated Transition: Product
Fielded Prototype



Behavior of Diluted Bitumen (Dilbit) in Fresh Water

2021-20

Mission Need: Better decision-making guidance for response to dilbit spills in fresh water.

Objectives

- Provide the U.S. Coast Guard (CG) Federal On-Scene Coordinators with decision-making guidance as they relate to the fate and transport of dilbit in the freshwater environment.
- Study the behavior (density and weathering) and response tools of dilbit spills in the freshwater environment.



Notes

- Supported by Great Lakes Restoration Initiative and Oil Spill Liability Trust Fund resources.
- Leverage CG Research and Development Center Project 4705: Oil Sands Products Spill Response.
- Collaborate with the International Institute for Sustainable Development's Experimental Lakes Area and U.S. Department of Energy labs.

Sponsor: CG-MER, CG D9

Stakeholder(s): EPA Great Lakes Nat'l Program Office/Pollution Response Office, LANT-54, NOAA

RDC Research Lead:
Benedette Adewale, PhD

CG-926 Domain Lead:
Ms. Karin Messenger

Anticipated Transition: Knowledge Product
Influence Tactics, techniques & Procedures

Project Timeline / Key Milestones

Project Start: Oct 20	
Literature Review Complete	Jan 21
Literature Review Report: Dilbit in the Environment	Feb 21 ★
Dilbit Test Plan Complete	Apr 21
CRREL Dilbit Weathering Warm Weather Test Complete	Jun 21
CRREL Dilbit Weathering Cold Weather Test Complete	Nov 21
Dilbit Oil Analysis Complete	Jan 22
Behavior of Bitumen in Freshwater (Report)	May 22 ★
Project Completion: May 22	



Acquisition Directorate
Research & Development Center



CG Research & Development Center
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Indicates RDC Product ★
October 2020 19

Nearshore and Inland Evaluation of the Estimated Recovery System Potential (ERSP) Calculator

4710

Mission Need: ERSP calculator to include response systems for nearshore/inland operating environment.

Objectives

- Determine if an enhanced version of the existing offshore ERSP calculator provides improved efficiency for planning and response to oil spills.
- Validate ERSP calculator functionality and usefulness using a prestigious national panel to conduct an independent review of the enhanced calculator.



Notes

- Oil Spill Liability Trust Fund funding.
- Partnership with Bureau of Safety and Environmental Enforcement (BSEE).

Sponsor: CG-MER **Stakeholder(s):** BSEE, AREA-54

RDC Research Lead: Mr. Alexander Balsley, P.E. **CG-926 Domain Lead:** Ms. Karin Messenger

Anticipated Transition: Product
Fielded Prototype

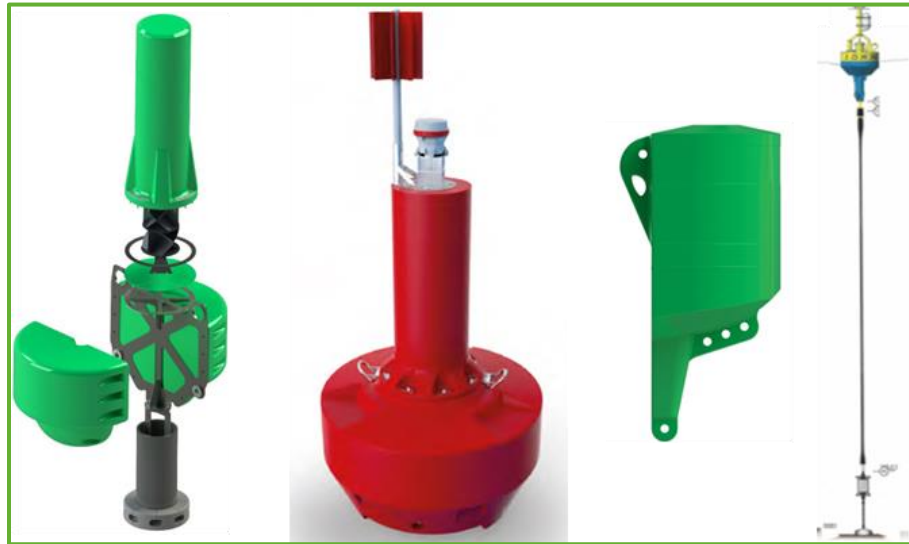
Project Timeline / Key Milestones

Project Start: 1 Oct 16	
Feasibility Workshop Completed	21 Jun 17 ✓ ★
Feasibility of Extending the ERSP Calculator for Nearshore and Inland Waterways (Report)	20 Sep 17 ✓ ★
Inland ERSP Preliminary Factors, Requirements and Conceptual Model (Report)	14 Nov 19 ✓ ★
Inland ERSP Operational Environment Calculator (Design Document)	30 Jun 20 ✓ ★
Initial Development of Inland ERSP Calculator Complete	Jan 21
National Academy of Sciences (NAS) Review Complete	Aug 21
NAS Response Review of Inland ERSP (White Paper)	Sep 21 ★
NAS Recommended ERSP Calculator Updates Complete	Apr 22
Inland Evaluation of the ERSP Calculator (Prototype & User Guide)	Jan 23 ★
Project Completion: Jan 23	

Next Generation Aids to Navigation Buoys & Alternative Moorings

Mission Need: Modernize U.S. Coast Guard (CG) Aids to Navigation (AtoN) buoys and moorings.

- Objectives**
- Determine the world-wide state of non-ferrous, aids to navigation (AtoN) buoys.
 - In conjunction with CG managers, field trial the most-promising prospects for replacing steel buoys.
 - Provide CG managers technical, cost, and operational benefits (if any) to modernize buoy inventory.
 - Conduct follow-up investigation of an alternative buoy-mooring system to determine CG applicability.



- Notes**
- Establish Cooperative Research and Development Agreements with vendors willing to work with the CG Research and Development Center for mutual benefit.
 - Coordinate with CG-NAV and the Data Center Optimization Initiative to involve International Association of Marine Aids to Navigation and Lighthouse Authorities as partners.

Sponsor: SILC-WOPL **Stakeholder(s):** CG-NAV, Districts

RDC Research Lead: Ms. Irene Gonin **CG-926 Domain Lead:** Ms. Karin Messenger

Anticipated Transition: Knowledge Product
Acquisition Milestone Support

Project Start: 1 Oct 19

Project Timeline / Key Milestones	Complete World Wide Market Study of Buoys	31 Mar 20 ✓
	Gather Feedback from Sponsor and Stakeholders	30 Jun 20 ✓
	Most Promising Buoys for Testing Complete	Aug 20
	Results of Survey/Market Study (Report)	Sep 20 ★
	Draft Test Plan for Buoys and Moorings Complete	Oct 20
	Engineering Design and Fabrication of Alternative Moorings Complete	Aug 21
	Next Generation Buoy and Alternative Mooring Field Test Update (Brief)	Sep 21 ★
	Field Test for Buoys and Moorings Complete	Oct 22
	New Buoy Field Trial and Alternative Moorings Summary (Report)	Jul 23 ★
	Project Completion: Jul 23	

Mission Need: Reduce Nonindigenous Invasive Species (NIS) transport risks in U.S. waters by vessel.

Objectives

- Determine the most practical BWM practices for Laker operators to reduce the risks of transporting NIS from one region of the Great Lakes (GL) to another when they are introduced from the outside by ocean-going ships.
- Research and develop robust, science-based technical Quality Assurance (QA) protocols to validate sub-Independent Lab (IL) QA/Quality Control shipboard test programs that support BWM System Type Approval (TA).
- Determine the availability and capabilities of existing technologies that field inspectors could use to verify compliance with the Ballast Water Discharge Standard (BWDS).
- Analyze the CG BWM Program impacts on GL invasion rates.



Notes

- FY18-FY20 Great Lakes Restoration Initiative funding (DW-070-95926401-0), (DW-070-20000108-0), (DW-70-95953301-0).
- Collaboration with Naval Research Laboratory.
- Collaboration with Smithsonian Environmental Research Center.
- Collaboration with the U.S. Department of Transportation Maritime Administration, Canadian Department of Fisheries & Oceans, and Transport Canada.

Sponsor: CG-OES, EPA Great Lakes Nat'l Program Office

Stakeholder(s): Marine Safety Center, CG-CVC, CG Inspectors

RDC Research Lead:
Ms. Gail Roderick

CG-926 Domain Lead:
Ms. Karin Messenger

Anticipated Transition: Knowledge Product
Standards/Regulations

Project Timeline / Key Milestones

Project Start: 1 Oct 17

BWM Alternatives for Lakers (Report)	31 Mar 20	✓ ★
IL Auditing Protocol For Facilities Performing TA Testing of BWM (Report)	17 Jun 20	✓ ★
Current State of BWDS Compliance Technologies (Report)	Jan 21	★
Audit Protocols for Shipboard Tests by IL (Report)	Sep 21	★
Tech Guidance for Use, Maint & Trng of BWDS Compliance Tools (Report)	Sep 21	★
Recommendation on Selection of NIS Sentinel Sites (Report)	Sep 21	★
Recommendation on Selection of BW Sentinel Sites (Report)	Sep 21	★
Draft Protocol for NIS Survey Methods for NIS Sentinel Sites (Report)	Dec 21	★
Draft Protocol for Shipboard Plankton Sampling at BW Sentinel Sites	Dec 21	★
Functional Char. for BWDS Compliance Tools (Report)	Apr 22	★
Validation of Audit Protocols for Shipboard Tests by IL (Report)	Jan 23	★
Eval of Commercially Available BWDS Compliance Technologies (Report)	Feb 23	★
Results of Year 1 BW Sampling and Sentinel Site Survey in the GL (Report)	Sep 23	★

Project Completion: Sep 23



Evaluate Network Accelerator Technology to Improve Cutter Information Technology (IT) Performance

8702

Mission Need: Hardware and software solutions to improve cutter IT performance.

Objectives

- Improve IT performance in a degraded, disconnected, and high latency environment by performing a limited user evaluation of selected equipment on an afloat unit.
- Make recommendations to sponsor and stakeholders about ways to most improve cutter IT application performance.



Notes

- Establish Cooperative Research and Development Agreement with Industry for commercial technology testing onboard USCG Cutters.

Project Timeline / Key Milestones

Project Start:

Please e-mail RDC-Info@uscg.mil for information concerning the Milestones and Deliverable Schedule.

Project Completion:

Sponsor: CG-68

Stakeholder(s): CG-761, C5ISC, CG-67, CGCYBER

RDC Research Lead:
Cutter IT Research Team

CG-926 Domain Lead:
Cutter IT Research Team

Anticipated Transition: Knowledge Product
Acquisition Milestone Support



Acquisition Directorate
Research & Development Center



CG Research & Development Center
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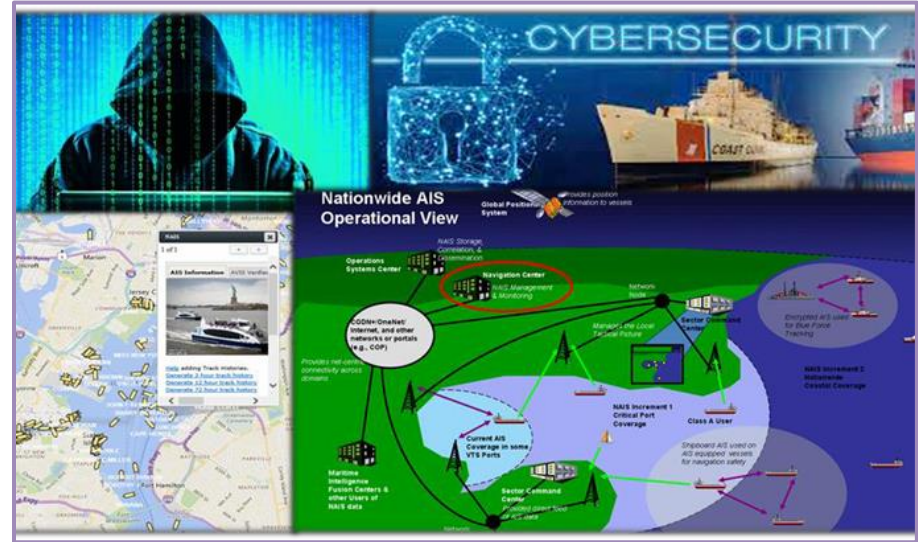
Indicates RDC Product ★

October 2020 23

Mission Need: Improve mariner safety by hardening the AIS against cyber attacks.

Objectives

- Recommend AIS data message authentication methods based on existing national and international cryptography research.
- Apply previous AIS signal bit-level range extension research to address cybersecurity through signal verification of radio frequency information (AIS 2.0).
- Demonstrate machine learning methods using Nationwide AIS data for cyber monitoring and alerting.



Notes

- Leveraging U.S. Coast Guard (CG) Research and Development Center Project 2218: Countering GPS Interference, Project 6211: Next Generation Arctic Navigational Safety Information System, and Project 7401: Machine Learning Platforms to Improve Coast Guard Tools.
- Leverage the U.S. Department of Homeland Security Homeland Security Systems Engineering and Development Institute/MITRE for machine learning analysis.

Sponsor: CG-761 **Stakeholder(s):** CG-68, CGCYBER, CG-761, C5ISC, CG-NAV, ICC, MIFCLANT/PAC, CGA

RDC Research Lead: Mr. Jay Spalding **CG-926 Domain Lead:** Ms. Holly Wendelin

Anticipated Transition: Knowledge Product
Standards/Regulations

Project Timeline / Key Milestones

Project Start: 1 Oct 19	
Complete International Encryption Methods Research	30 Jun 20 ✓
AIS Data Authentication (Brief)	Oct 20 ★
AIS Signal Verification (Brief)	Jan 21 ★
Lab Demonstration of AIS Cyber Attack Defense & Mitigation Complete	Mar 21
Machine Learning Applicability to AIS Complete	Apr 21
AIS Machine Learning (Brief)	Jun 21 ★
AIS Cyber Security (Report)	Sep 21 ★
Project Completion: Sep 21	

Radio Frequency (RF) Communications in a Cloud Environment

8503

Mission Need: RF communications capabilities as virtualized services in a cloud environment.

Objectives

- Satisfy existing RF communications requirements by leveraging U.S. Coast Guard (CG) network infrastructure along with CG One View (CG1V) and approved cloud access points.
- Investigate the cloud service, architecture, and implementation that provides the best solution for replacing existing RF communications components in the Rescue 21 (R21) system.
- Replace existing backend server components currently deployed at R21 Remote Fixed Facilities and Sector Command Centers with cloud-based capabilities and perform system demonstration (Phase 1).
- Replace existing R21 user console with cloud-based web accessible interface and perform system demonstration (Phase 2).
- Assess operational improvements and make NextGen R21 recommendations.



Notes

- Technical design and execution with C5ISC Communications Systems Product Line.
- Leverage Cooperative Research and Development Agreement (CRADA) with industry.
- Leverages prior RDC cloud environment research.
- Coordinate with CG-68 for CG cloud pilot.

Sponsor: CG-761

Stakeholder(s): CG-68, CG-67, CG-741, CG-SAR, C5ISC, CGCYBER

RDC Research Lead:
Ms. Anita Trombino

CG-926 Domain Lead:
Ms. Holly Wendelin

Anticipated Transition: Product
Fielded Prototype

Project Timeline / Key Milestones

Project Start: 12 Feb 20	
CRADA Established	21 Jan 20 ✓
System Architecture Design Complete	27 Mar 20 ✓
Cloud Environment Established	Jun 22 ✓
Phase 1 R21 Cloud Prototype Deployed & Connected	Dec 20
Phase 1 Testing Complete	Dec 20
RF Comms Cloud Suitability Phase 1 (Brief)	Jan 21 ★
Phase 2 User Interface to CG1V Developed & Deployed	Mar 21
Phase 2 Testing Complete	Jul 21
RF Comms Cloud Suitability (Report)	Sep 21 ★
Project Completion: Sep 21	



Acquisition Directorate
Research & Development Center



CG Research & Development Center
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Indicates RDC Product ★
October 2020 25

Extended Reality (XR) Capabilities for Coast Guard Mission Support

8107

Mission Need: Improve efficiency & effectiveness of maintenance and training across the CG.

Objectives

- Enhance the U.S. Coast Guard's (CG) ability to train personnel and perform maintenance on CG assets by identifying maintenance, training, tools, processes, and procedures used by military and industry that will:
 - Reduce the labor burden of technicians by providing current maintenance information via XR technologies.
 - Increase the availability of assets by improving the efficiency of maintenance and reducing costly errors.
 - Improve the effectiveness of training and reduce the time to train personnel.
- Create a roadmap that will enable the sponsor to generate requirements and successfully implement extended reality capabilities throughout the CG to improve the performance of mission support services.



Notes

- Includes partnerships with Massachusetts Institute of Technology Lincoln Laboratory, Naval Sea Systems Command Portsmouth Naval Shipyard, Microsoft Technology Center Boston, and other U.S. Department of Defense components that have successfully adopted XR technologies in their mission support programs.
- Uses agile scrum development and rapid contracting through Defense Logistics Agency's Tailored Logistic Support Program.

Sponsor: FORCECOM

Stakeholder(s): CG-1B3/41/45/5PC/67/751/761 /933, ALC, ATTC, CGA, SFLC, TRACEN Yorktown

RDC Research Lead:
Mr. Jon Turban

CG-926 Domain Lead:
Ms. Holly Wendelin

Anticipated Transition: Knowledge Product
Future Technology

Project Timeline / Key Milestones

Project Start: 30 Nov 17

Market Research/Technology Assessment (Brief)	19 Dec 18 ✓ ★
87' WPB Augmented Reality Maintenance Prototype Delivered	18 Sep 19 ✓
Limited User Evaluation - Surface Community (Brief)	Oct 20 ★
Aviation Augmented Reality Maintenance Prototype Delivered	Dec 20
Marine Inspection XR Training Prototype Delivered	May 21
Limited User Evaluation - Aviation Community (Brief)	Aug 21 ★
Limited User Evaluation - Training Community (Brief)	Jan 22 ★
Mission Support XR Roadmap Complete	Mar 22
XR Capabilities for CG Mission Support (Report & Brief)	Jul 22 ★
Project Completion: Jul 22	



Acquisition Directorate
Research & Development Center



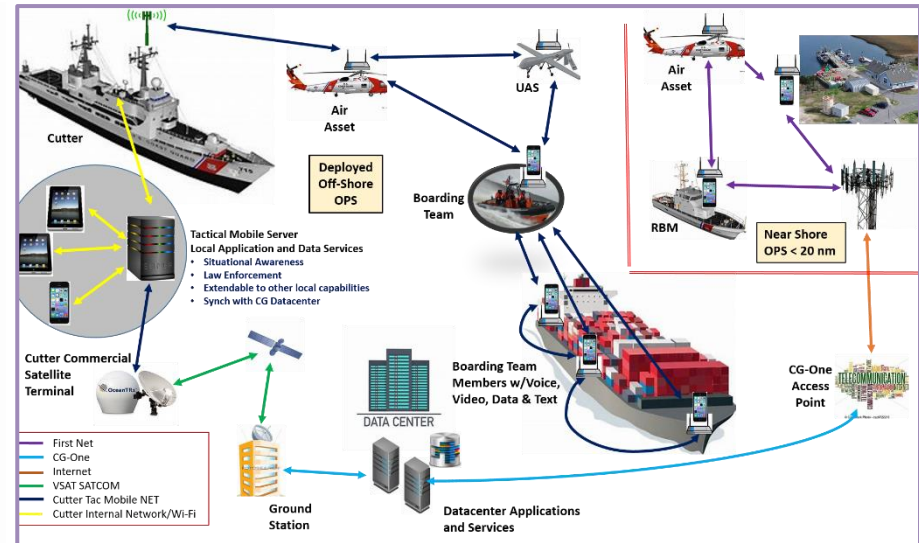
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Indicates RDC Product ★
October 2020 26

Mission Need: Improve boarding team safety, security, & mission efficiency.

Objectives

- Define protected, standards based mobile architectures to interface with U.S. Coast Guard (CG) Maritime and Avionic Systems.
- Phase 1
 - Investigate opportunities to partner with industry
 - Conduct Interviews with CG Boarding Teams (BTs), project sponsor and stakeholders to develop a list of functional characteristics
 - Conduct Market Research of COTS and GOTS tactical mobile network technologies/architectures and score using scoring methodology
 - Develop, staff, and deliver Tactical Market Research document.
- Phase 2
 - Conduct Limited User Evaluation of Selected Technologies to assess top scored proof of concept technologies against desired characteristics.
 - Develop, Route, and Deliver Tactical Mobile Technology Evaluation Brief.
 - Evaluate best technology solution architectures to deploy selected technology.
 - Evaluate selected technology solution architectures.
 - Develop, route, and Deliver Improve Cutter Boarding Team Efficiency Report.



Notes

- Partner with Air Force Institute of Technology to leverage systems engineering modeling capability.
- Research U.S. Navy, Special Forces and Department of Homeland Security components tactical mobile communications architectures
- Interview CG BT/Law Enforcement Detachment, U.S. Department of Defense, Department of Justice, Department of Homeland Security, and BT policy makers to identify functional characteristics in an ideal and an acceptable scenario.

Sponsor: CG-761

Stakeholder(s): CG-67/68/721/751/9324/, CG-MLE, LANT, PAC, C5ISC, CGCYBER, TACLETS

RDC Research Lead:
Mr. David Cote

CG-926 Domain Lead:
Ms. Holly Wendelin

Anticipated Transition: Product
Fielded Prototype

Project Timeline / Key Milestones

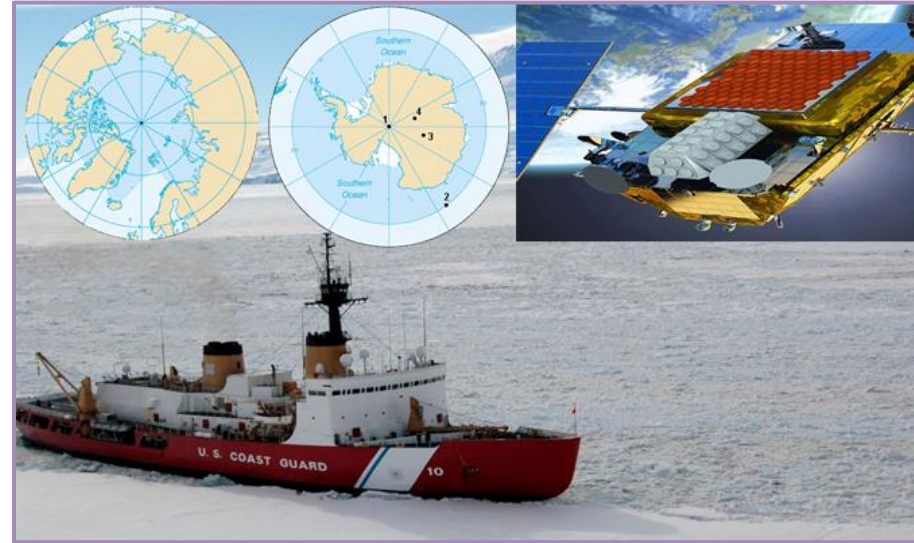
Project Start: Oct 20		
Interviews w/CG Cutter BTs and Policy Makers Complete		Dec 20
Review of CG Previous/Current Efforts Complete		Dec 20
Tactical Mobile COTS/GOTS Tech Evaluation Complete		Mar 21
Tactical Mobile Technology Market Research (Report)	May 21	★
Selected Technology Limited User Evaluation Complete		Sep 21
Tactical Mobile Technology Evaluation (Brief)	Nov 21	★
Deployment Solution Architecture Evaluation Complete		Mar 22
Selected Solution Architecture Evaluation Complete		May 22
Improve Cutter Boarding Team Efficiency (Report)	Jun 22	★
Project Completion: Jul 22		



Mission Need: Provide network connectivity to Cutters operating at high latitudes.

Objectives

- Influence the desired minimum connectivity functional characteristics by analyzing previous U.S. Coast Guard (CG) Research and Development Center (RDC) Arctic Communications and Cutter Connectivity projects within last 10 years.
- Influence the desired minimum connectivity functional characteristics by analyzing prior U.S. Department of Defense High Latitude (Hi-Lat) research projects within last 10 years, including U.S. Navy and North Atlantic Treaty Organization Combined Joint Operations from the Sea.
- Build and test a Hi-Lat cutter connectivity test bed.
- Deploy a prototype solution and perform a limited user evaluation and report on system capabilities for best in class determination.



Notes

- Leverage CG RDC Projects 6208: Arctic Communications Technology Assessments, 8702: Evaluate Network Accelerator Technology to Improve Cutter Information Technology Performance, and 7759: Evaluation of Potential CG Use of CubeSats.
- Partner with the Department of Homeland Security Science and Technology Directorate Office of University Programs, and USN Stratospheric Community of Interest.
- Partner with C5ISC Deployed Connectivity Section.
- Align with C5ISC SATCOM procurement.

Sponsor: CG-761

Stakeholder(s): CG-67, CG-68, CG-751, LANT/PAC-6, C5ISC, ALC

RDC Research Lead:
Mr. Jon Turban, P.E.

CG-926 Domain Lead:
Ms. Holly Wendelin

Anticipated Transition: Product
Fielded Prototype

Project Timeline / Key Milestones

Project Start: Oct 20	
Review of Previous Projects and Research Complete	Feb 21
High Latitude Satellite Systems Market Research Complete	Feb 21
High Latitude Cutter Connectivity Testbed (Brief)	Jun 21 ★
Limited User Evaluation Complete	Apr 22
High Latitude Underway Connectivity (Report)	Sep 22 ★
Project Completion: Sep 22	

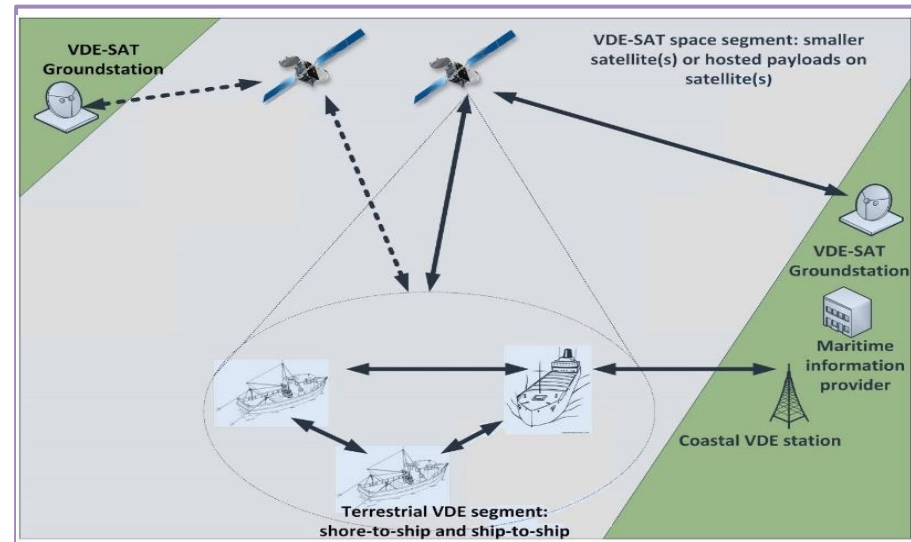


Evaluation and Testing of VHF Data Exchange System (VDES) Impacts on the Automatic Identification System (AIS)

Mission Need: Determine VDES benefits and path to implementation to support CG operations.

Objectives

- Understand the capabilities and limitations of VDES.
- Identify steps for U.S. Coast Guard (CG) Implementation of VDES.
- Identify steps to shift CG tactical data transmissions from AIS channels to VDES application specific message channels.
- Evaluate VDES capabilities to disseminate various types of Maritime Safety Information (MSI).
- Understand the requirements for CG shore-side management of VDES.



Notes

- Work closely with the Canadian Coast Guard, Electronics and Information Services, Quebec.
- Leverage prior CG Research and Development Center work completed concerning options and impacts for VDE and AIS.

Sponsor: CG-761 **Stakeholder(s):** CG-67, CG-68, CG-9335, CG-NAV, NAVCEN, C5ISC

RDC Research Lead: Ms. Irene Gonin **CG-926 Domain Lead:** Ms. Holly Wendelin

Anticipated Transition: Knowledge Product
Future Technology

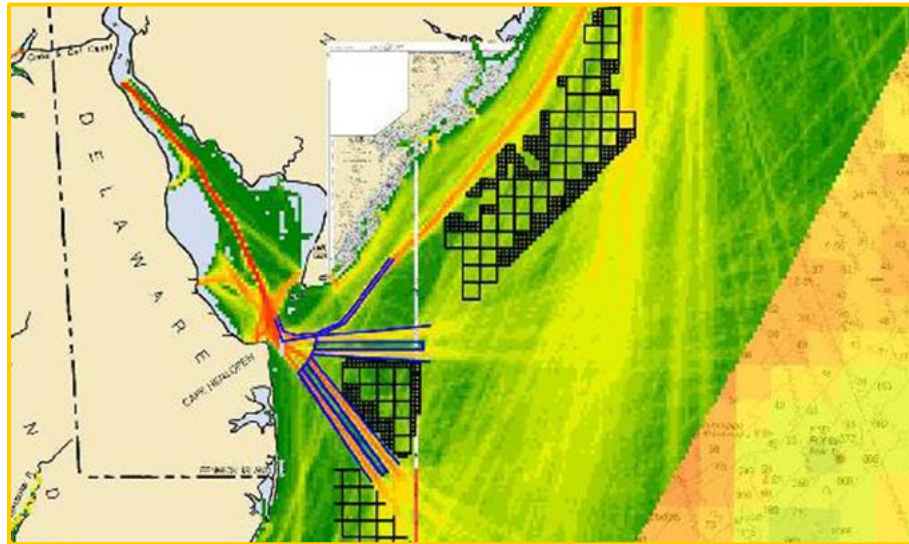
Project Timeline / Key Milestones	Project Start: 1 Oct 19	
	Technology Roadmap Investigation Complete	Sep 20
	VDES Technology Roadmap (Report)	Feb 21 ★
	Test Plan-Equipment Integration- Lab Test Complete	Mar 21
	Phase 1 Field Trials – VDES Evaluation of CG Tactical Data Transmission - Limited User Eval Complete	Oct 21
	Sensitive but Unclassified Tactical Information Exchange and Display System (STEDS) using VDES (Report)	Dec 21 ★
	Phase 2 Field Trials – VDES Evaluation of the Dissemination of MSI - Limited User Eval Complete	Oct 22
	VHF Data Exchange System Field Trial (Report & Brief)	Mar 23 ★
	Project Completion: Mar 23	



Research into Navigational Safety Risk Modeling and Analysis Tool

Mission Need: Capability to fully characterize the navigational risk of offshore structures.

- Objectives**
- Create an analytical modeling process and analysis tools to predict changes in traffic patterns and determine the resultant changes in navigational safety risk.
 - Create the ability to assess the proposed wind energy areas to further refine appropriate distances between shipping and structures.
 - Create the ability to test routing measures to mitigate risk posed by fixed structures.



Notes

- This project is a result of the requirements specified in the Atlantic Coast Port Access Route Study as documented in the Interim Report from Jul 2012 and the Final Report from Feb 2016.

Sponsor: CG-5PW **Stakeholder(s):** LANT-54, CG-NAV

RDC Research Lead: Ms. Christine Hansen **CG-926 Domain Lead:** CDR Craig Murray

Anticipated Transition: Knowledge Product
Influence Tactics, Techniques, & Procedures

Project Start: 3 Oct 16

Risk Modeling Tools Assessed	31 Aug 18 ✓
Automatic Identification System Risk Modeling Data Package Created	5 Dec 18 ✓
Offshore Energy Risk Assessment Tool Envisioned	31 May 19 ✓
Test Risk Modeling Package Created	26 Jul 19 ✓
Navigational Safety Risk Modeling and Analysis Tool Summary Report (Model & Report)	6 Nov 19 ✓ ★
Assessment Tool and Methodology Refined	Sep 20
Full-Scale Process Walk-Through Completed	Sep 20
Navigational Safety Risk Modeling and Analysis After Action Report (Report)	Dec 20 ★

Project Completion: Dec 20

Mission Need: Demonstrate the value and application of machine learning for improving USCG tools.

Objectives

- Identify application areas for implementation of Artificial Intelligence(AI)/ Machine Learning (ML) approaches to support CG mission execution.
- Determine if any current applications can be usefully applied to additional CG missions by reviewing the application of AI/ML in the CG, U.S. Department of Defense (DoD), and U.S. Department of Homeland Security (DHS).
- Develop a prototype solution for selected application area.



Notes

- Potential partnerships with the Air Force Institute of Technology and Naval Postgraduate School.
- Leverage AI/ML efforts by DoD, Department of Energy (DoE) Labs and MIT Lincoln Laboratory.

Sponsor: CG-771 **Stakeholder(s):** CG-761

RDC Research Lead: Mr. Sam Cheung **CG-926 Domain Lead:** CDR Craig Murray

Anticipated Transition: Knowledge Product
Influence Tactics, Techniques, & Procedures

Project Timeline / Key Milestones	Project Start: 1 Oct 19	
	Identification of High-level Application Areas for AI/ML Solutions Complete	30 Jun 20 ✓
	Review of CG, DoD, and DHS Applications of AI/ML Solutions Complete	Sep 20
	Identification of Application Area for Solution Development Complete	Oct 20
	Develop Solution for Selected Application Area (Prototype)	Feb 21 ★
	Machine Learning Platforms to Improve Coast Guard Tools (Report)	May 21 ★
Project Completion: May 21		



Condition-Based Maintenance (CBM) for Coast Guard Asset Product Lines

9204

Mission Need: Targeted CBM for higher asset availability and reduced life cycle costs.

Objectives

- Implement condition-based and predictive maintenance activities within the surface and aviation communities by researching and documenting significant opportunities for using leading indicators and readily available system information, including the following system characteristics: interfaces, data structure, data analysis, and data display that support a data driven system.
- Develop demonstration case studies using predictive maintenance with U.S. Coast Guard (CG) data to provide recommendations for systems and steps required to accommodate desired functional characteristics of a data driven system.



Notes

- Partner with the CG Surface Forces Logistics Center (SFLC) and Aviation Logistics Center (ALC) to make recommendations.
- Partner with Naval Postgraduate School, Air Force Institute of Technology, Naval Academy, Massachusetts Institute of Technology, U.S. Department of Homeland Security (DHS) Science and Technology Directorate (S&T) Office of University Programs, Air Force Research Laboratory, and Connecticut National Guard.

Sponsor: CG-45, CG-41 **Stakeholder(s):** SFLC, ALC

RDC Research Lead: Ms. Christine Hansen **CG-926 Domain Lead:** CDR Craig Murray

Anticipated Transition: Knowledge Product
Acquisition Milestone Support

Project Timeline / Key Milestones

Project Start: 1 Apr 19	
Surface Asset Maintenance Characteristics Reviewed	1 Apr 19 ✓
Surface CBM Market Research Initiated	29 Oct 19 ✓
Academic Partnership Engagement Initiated	1 Dec 19 ✓
CBM for CG Asset Product Lines (Brief)	14 Feb 20 ✓ ★
Aviation Asset Maintenance Characteristics Reviewed	15 Feb 20 ✓
Aviation CBM Market Research Initiated	Oct 20
CBM for CG Asset Product Lines Summary Report (Report)	Sep 21 ★
Project Completion: Sep 21	

Mission Need: Repeatable process automation to enable operational and mission support efficiencies.

Objectives

- Identify a standardized method for determining appropriate Robotic Process Automation (RPA) candidates and available tools.
- Identify challenges to acquiring and implementing RPA solutions.



Notes

- Leverage existing U.S. Coast Guard Research and Development Center Project 7401: Machine Learning Platforms to Improve Coast Guard Tools.
- Coordinate with the Joint Artificial Intelligence Center, U.S. Coast Guard Finance Center (FINCEN), and the Department of Homeland Security RPA Working Group.
- Potential partnership with Naval Postgraduate School.

Project Timeline / Key Milestones

Project Start: Oct 20	
FINCEN Effort/Progress Research, Literature Review Complete	Jan 21
Identification of RPA Candidate Criteria/Method Complete	Jan 21
Identification of RPA Prototype Use-case Complete	Apr 21
Progress and Use-case Selection (Brief)	May 21 ★
Prototype Development and Evaluation Complete	Dec 22
Applications of Robotic Process Automation (Report)	Feb 23 ★
Project Completion: Feb 23	

Sponsor: CG-67 **Stakeholder(s):** CG-62, CG-86, CG-68, CG-761, CG-1B3, CG-82, CG-4, FORCECOM, FINCEN

RDC Research Lead: LT David Kent **CG-926 Domain Lead:** CDR Craig Murray

Anticipated Transition: Knowledge Product
Influence Tactics, Techniques, and Procedures

Mission Need: Persistent maritime domain awareness using AUSVs.

Objectives

- Assess potential employment options using Autonomous Underwater and Surface Vehicles (AUSV) to support U.S. Coast Guard (CG) mission areas.
- Assess AUSV characteristics and Concept of Operations (CONOPs), including:
 - Space, weight, and power requirements;
 - Payloads;
 - Effectiveness of single and multiple (swarming) AUSVs; and
 - Effectiveness of AUSV and unmanned aerial system teaming.



Notes

- Partner with the U.S. Department of Homeland Security (DHS) Science, Technology Directorate (S&T) Borders, Immigration and Maritime (BIM), U.S. Naval Research Laboratory, Naval Undersea Warfare Center, and Dahlgren.
- Collaboration with the U.S. Navy Science Advisor on their SWARM effort.

Sponsor: DHS S&T BIM, CG-26

Stakeholder(s): AREAS, CG-721, CG-MLE

RDC Research Lead:
Ms. Christine Mahoney

CG-926 Domain Lead:
Mr. Scott Craig

Anticipated Transition: Knowledge Product
Future Technology

Project Timeline / Key Milestones

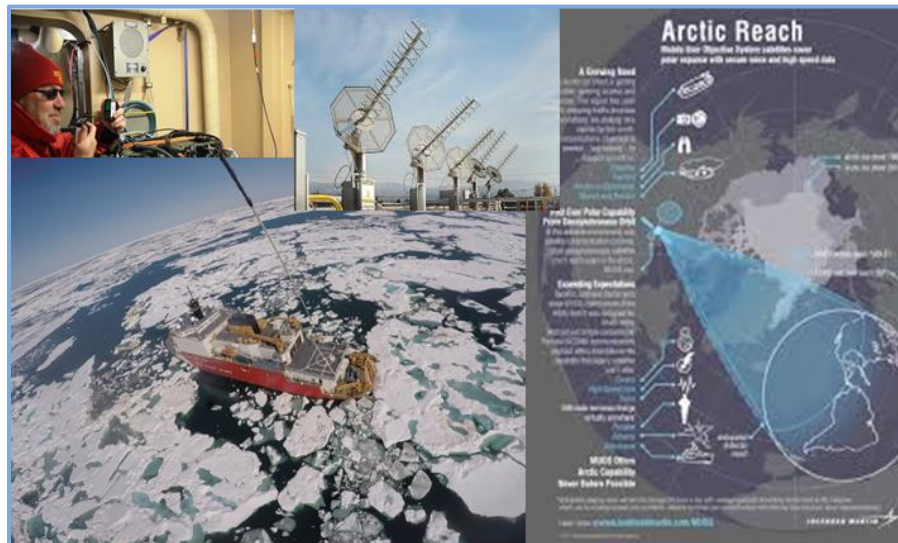
Project Start: 1 Oct 19	
Scoped/Baselined Desired Payload Functional Characteristics	Sep 20
AUSV Sensor Network System Model Complete	Dec 20
Technical Development/Integration Plan Complete	Jan 21
Test Event 1 – Single AUSV Evaluation Complete	May 21
Test Event 2 – Multiple AUSV Evaluation Complete	Aug 21
MUST - FY21 Test & Evaluation Progress Update (Brief)	Nov 21 ★
Test Event 3 – Swarming AUSV Evaluation Complete	Aug 22
MUST - FY22 Test & Evaluation/Viability Progress Update (Brief)	Nov 22 ★
Test Event 4 – Teaming AUSV Evaluation Complete	Sep 23
Maritime Unmanned System Technology (Report)	Nov 23 ★
Project Completion: Nov 23	



Mission Need: Provide support to relevant research efforts in the Arctic.

Objectives

- Provide support to projects which develop capability improvements in the execution of U.S. Coast Guard (CG) missions in the Arctic.
- Cultivate joint efforts and interagency cooperation between government sectors and civilian entities.



Notes

- Outreach partners included the Bureau of Safety and Environmental Enforcement, the U.S. Department of Homeland Security Office of University Programs, U.S. Department of Defense Labs, U.S. Northern Command, and National Labs.

Sponsor: CG-7

Stakeholder(s): CG-5PW, CG-751, CG-761, PAC-5, LANT-5, D17

RDC Research Lead:
Mr. Scot Tripp

CG-926 Domain Lead:
Ms. Holly Wendelin

Anticipated Transition: Knowledge Product
Future Technology

Project Timeline / Key Milestones

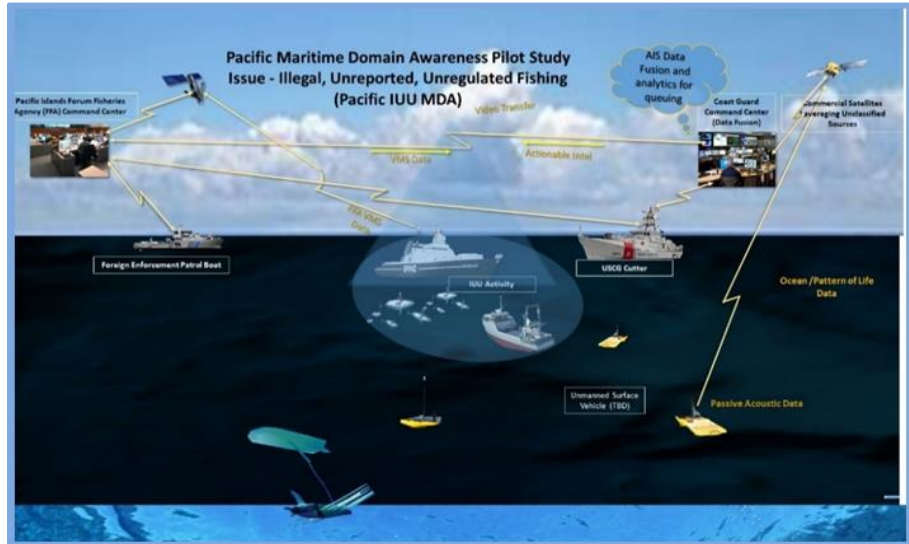
Project Start: 3 Dec 18	
Partners/Technologies/Test Plans Identified (FY19)	14 Jun 19 ✓
FY20 Research Efforts/Partners Solicited	30 Aug 19 ✓
CGC HEALY Tests/Demonstrations Complete (FY19)	28 Oct 19 ✓
Arctic Technology Evaluation 2019 – Communications Technology Focus (Application Note)	30 Apr 20 ✓ ★
Partners/Technologies Scheduled (FY20)	14 Jul 20 ✓
FY21 Research Efforts/Partners Solicited	Aug 20
CGC CAMPBELL Tests/Demonstrations Complete (FY20)	Oct 20
Arctic Technology Evaluation FY20 (Application Note)	Dec 20 ★
Project Completion: Dec 20	



Mission Need: Improve Maritime Domain Awareness (MDA) in remote areas.

Objectives

- Deliver decision support information regarding potential improvements in MDA through use of low-cost USV technologies by performing and documenting results of 30 day on-water technology demonstration of commercially available Unmanned Surface Vehicle (USV) and sensor systems to improve actionable MDA in remote Pacific regions.



Notes

- Legislative requirement.
- Collaborating with U.S. Coast Guard Auxiliary, U.S. Customs and Border Protection, multiple U.S. Navy Science Advisors (USN 4th Fleet, USN Commander Fleet Forces Command, USN Commander Submarine Forces, and USN Commander Pacific Fleet), and National Oceanic and Atmospheric Administration.

Sponsor: CG-26 **Stakeholder(s):** CG-711, CG-721, CG-761, CG-MLE, LANTAREA, D14, PACAREA, D17

RDC Research Lead: Mr. Scot Tripp **CG-926 Domain Lead:** Mr. Scott Craig

Anticipated Transition: Knowledge Product
Future Technology

Project Start: 6 Jun 18

Request for Information for Industry Engagement Issued	30 Sep 18 ✓
Request for Proposal for Field Demonstrations Issued	7 Nov 19 ✓
Technology Demonstration Contracts Awarded	7 Feb 20 ✓
Low-Cost Maritime Domain Awareness Pilot Study Status Brief Complete	Aug 20
Field Demonstration Complete	Nov 20
Low-Cost Maritime Domain Awareness Pilot Study (Report)	Apr 21 ★
Project Completion: Apr 21	

Bromine-Free Water Purification Systems

5507

Mission Need: Evaluate newer, less hazardous water purification systems.

Objectives

- Deliver decision support information regarding effective utilization of bromine-free water purification systems for National Security Cutters and Fast Response Cutters.



Notes

- Legislative requirement.
- Collaborating with U.S. Army Engineer Research and Development Center (ERDC) Construction Engineering Research Laboratory (CERL), Naval Surface Warfare Center – Carderock Division (NSWCCD), and U.S. Naval Research Laboratory (NRL).

Sponsor: Surface Force Logistics Center (SFLC)

Stakeholder(s): CG-45, SFLC-LRE

RDC Research Lead:
Ms. D. J. Hastings

CG-926 Domain Lead:
LT Steve Hager

Anticipated Transition: Product
Pending Acquisition

Project Timeline / Key Milestones

Project Start: 27 Jul 19

Bromine-Free Water Purification Partners Identified and Pilot Study Started 19 Jun 20 ✓

Bromine-Free Water Purification System (Brief) 9 Jul 20 ✓ ★

Bromine-Free Water Purification Systems Pilot Feasibility Analysis Complete Apr 21

Bromine-Free Water Purification System Pilot Study (Report) Jul 21 ★

Project Completion: Jul 21



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October 2020 37

Counter Unmanned Underwater Vehicle (C-UUV)/ Anti-Swimmer Technology

5922

Mission Need: Improved detection, tracking, classification, and deterrence of underwater threats.

Objectives

- Deliver decision support information regarding improved C-UUV/Anti-Swimmer capabilities for detection, tracking, classification, and deterring underwater threats by performing and documenting results of Limited User Evaluation (LUE) for C-UUV/Anti-Swimmer capabilities.



Notes

- Building on past U.S. Coast Guard (CG) Research and Development Center anti-swimmer work.
- Coordinating with U.S. Naval Research Laboratory, Naval Special Warfare Development Group, Special Operations Command, and North Atlantic Treaty Organization Combined Joint Operations from the Sea.
- Exploring Cooperative Research and Development Agreements (CRADA) to support LUE.

Project Timeline / Key Milestones

Project Start:

Please e-mail RDC-Info@uscg.mil for information concerning the Milestones and Deliverable Schedule.

Project Completion:

Sponsor: CG-721

Stakeholder(s): CG-45, CG-731, CG-761, AREA-3

RDC Research Lead:
C-UUV Research Team

CG-926 Domain Lead:
C-UUV Research Team

Anticipated Transition: Knowledge Product
Future Technology



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October 2020 38

Mission Need: Improved accuracy and reliability in multifunction chemical detection.

Objectives

- Deliver decision support information regarding state-of-the-market multifunction chemical detectors for U.S. Coast Guard (CG) operation in maritime environments.
- Deliver decision support information regarding Tactics, Techniques, and Procedure (TTP) opportunities to improve accuracy, reliability, and usability of drug and explosives detection technologies.



Notes

- Collaborating with Countering Weapons of Mass Destruction Office, U.S. Department of Homeland Security (DHS) Science and Technology Directorate (S&T) Strategic Sourcing Initiative, National Urban Security Technology Laboratory, Transportation Security Laboratory, Transportation Security Administration, and U.S. Customs and Border Protection.
- Leverages past CG Research and Development Project 5802: Maritime Trace Narcotic Identification/Verification.

Sponsor: CG-721

Stakeholder(s): DSF, NSF, CG-MLE, DHS S&T, CG-1B3, FORCECOM

RDC Research Lead:
Ms. D.J. Hastings

CG-926 Domain Lead:
LT Steve Hager

Anticipated Transition: Knowledge Product
Influence Tactics, Techniques, & Procedures

Project Timeline / Key Milestones

Project Start: 1 Oct 19	
Handheld Illicit Drug – Explosive Trace Detector (HID-ETD) Technical Evaluation CG Feedback Submitted	21 Apr 20 ✓
DHS System Assessment and Validation for Emergency Responders (SAVER) Detector Analysis Started	30 Jun 20 ✓
Drug and Explosives Detection System Assessment and Validation for Emergency Responders (Report)	Nov 20 ★
HID-ETD Limited User Evaluation (LUE) Plan Developed and Devices Obtained	Feb 21
HID-ETD LUE Completed	Aug 21
Handheld Illicit Drug – Explosives Trace Detector (Report)	Sep 21 ★
Project Completion: Sep 21	



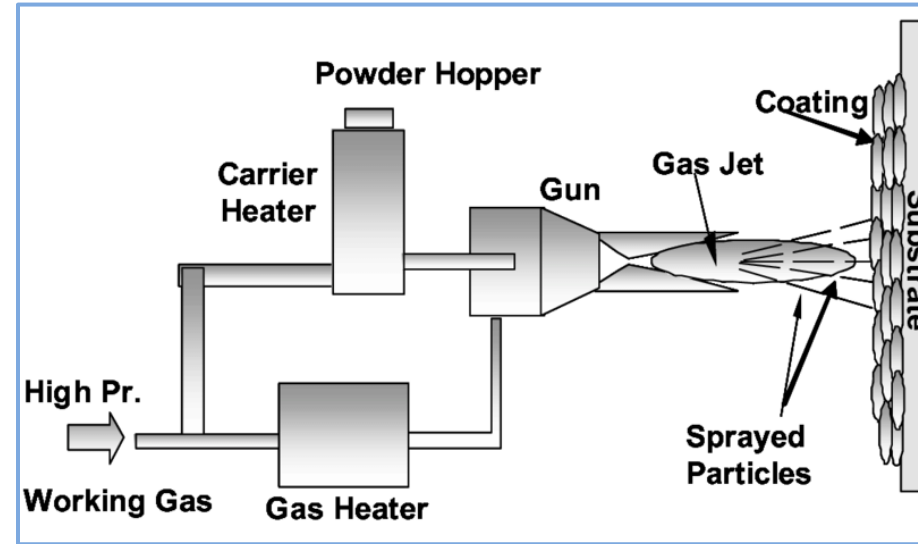
Cold Spray Restoration of Vessel and Aircraft Components

2021-11

Mission Need: Cold spray restoration of vessel and aircraft components to support mission readiness.

Objectives

- Document process/criteria to identify U.S. Coast Guard (CG) vessel and aircraft components which are good candidates for restoration using cold spray.
- Document process to work with Original Equipment Manufacturers, or any capable entity, on cold spray restoration.
- Deliver decision support information regarding effective utilization of cold spray to improve CG surface and aviation mission readiness.



Notes

- Partner with CG's Additive Manufacturing Working Group.
- Leverage research from the Army Research Laboratory, Ellsworth Air Force Base, Army Combat Capabilities Development Command Aviation & Missile Center, Adelphi Laboratory Center, Cold Spray Action Team Workshop, Connecticut National Guard, Naval Postgraduate School Sea Land Air Military Research Initiative, Oak Ridge National Laboratory, and Department of Energy National Laboratories.
- Partner with Naval Research Lab and other Lab-Sync partners.
- Explore Cooperative Research and Development Agreement with Industry.

Sponsor: CG-4

Stakeholder(s): CG-41, CG-45, CG-711, SFLC, ALC

RDC Research Lead:
LT Ryan Huebner

CG-926 Domain Lead:
LT Steve Hager

Anticipated Transition: Knowledge Product
Future Technology

Project Timeline / Key Milestones

Project Start: Oct 20

Visit to Department of Defense (DoD) and Commercial Cold Spray Facilities Complete Jan 21

Parts identified, Restored, and Tested for Repair Quality Apr 21

Cold Spray Restoration of Vessel and Aircraft Components (Brief) Jul 21 ★

Cost Benefit Analysis: DoD vs. Commercial vs. CG Facility Complete Jan 22

Cold Spray Restoration of Vessel and Aircraft Components (Report) Mar 22 ★

Project Completion: Mar 22



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October 2020 40

Enhanced Rotary Wing Night Vision Goggle (NVG) Searches

2021-16

Mission Need: Improved NVG/augmented lighting to support SAR and LE missions.

Objectives

- Deliver decision support information regarding Tactics, Techniques, and Procedure (TTP) opportunities to enhance rotary wing NVG searches for both Search and Rescue (SAR) and Law Enforcement (LE) missions by performing and documenting results of a Limited User Evaluation (LUE) for enhanced rotary wing NVG searches. Research focus will primarily be on augmented lighting sources and their ability to improve existing NVG technologies.



Notes

- Explore collaboration opportunities with Air Force Research Laboratory, Naval Research Laboratory, Army Research Laboratory (Adelphi Laboratory Center and CCDEVCOM C5ISR Center, Night Vision and Electronic Sensors Directorate, Special Products and Prototyping Division), and North American Treaty Organization Combined Joint Operations from the Sea.

Sponsor: CG-SAR

Stakeholder(s): CG-1B3, CG-711, CG-761, CG-41, ALC, ATC, LANT, PAC, FORCECOM

RDC Research Lead:
Mr. Mike Coleman

CG-926 Domain Lead:
LT Steve Hager

Anticipated Transition: Knowledge Product
Influence Tactics, Techniques, & Procedures

Project Timeline / Key Milestones

Project Start: Oct 20	
Commercial/Military Lab NVG & Lighting Advancements Investigated	May 21
Technologies Selected for LUE	Jul 21
Augmented Lighting Down-select (Brief)	Aug 21 ★
LUE Test Plan Developed and Technologies Acquired	Jan 22
LUE Completed	Mar 22
Enhanced TTP Recommendations Developed	Jun 22
Augmented Lighting Limited User Evaluation (Report)	Sep 22 ★
Project Completion: Sep 22	



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October 2020 41

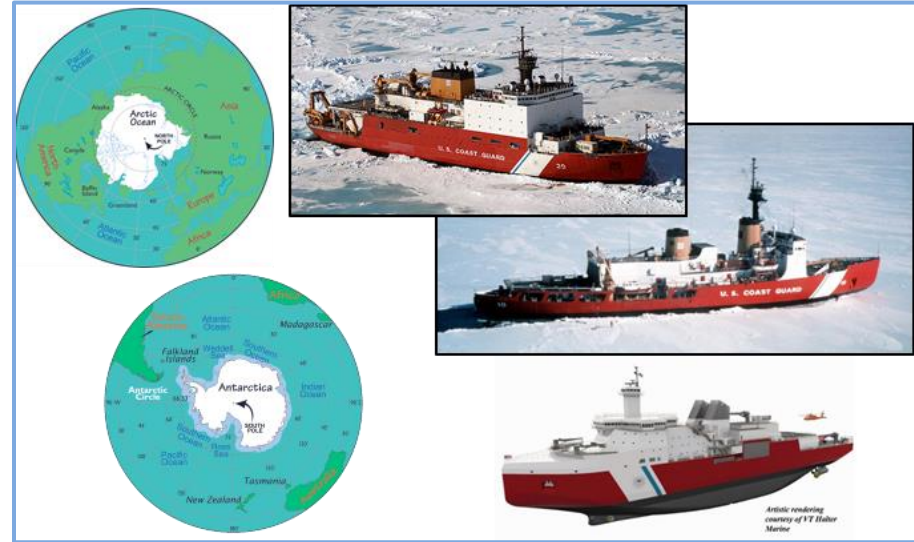
Polar Regions Technology Evaluation 2021 - 2022

62103

Mission Need: Provide support to relevant research efforts in the Polar Regions.

Objectives

- Provide support to projects which develop capability improvements in the execution of U.S. Coast Guard (CG) missions in Polar regions.
- Cultivate joint efforts and interagency cooperation between government sectors and civilian entities.



Notes

- Anticipate partnerships with the Bureau of Safety and Environmental Enforcement, U.S. Department of Homeland Security Office of University Programs, U.S. Department of Defense Labs, U.S. Northern Command, National Labs, Office of Naval Research Science Advisor in Prague for communications capabilities, and the National Science Foundation U.S. Antarctic Program (McMurdo Station).

Sponsor: CG-7

Stakeholder(s): CG-5PW, CG-751, CG-761, PAC-5, LANT-5, D17

RDC Research Lead:
Mr. Scot Tripp

CG-926 Domain Lead:
Ms. Karin Messenger

Anticipated Transition: Knowledge Product
Future Technology

Project Timeline / Key Milestones

Project Start: Dec 20	
Partners/Technologies/Test Plans Identified (FY21)	Apr 21
FY21 Research Efforts/Partners Solicited	May 21
Tests/Demonstrations Complete (FY21)	Oct 21
Arctic Technology Evaluation FY21 (Application Note)	Mar 22 ★
Partners/Technologies/Test Plans Identified (FY22)	Apr 22
FY22 Research Efforts/Partners Solicited	May 22
Tests/Demonstrations Complete (FY22)	Oct 22
Arctic Technology Evaluation FY22 (Application Note)	Mar 23 ★
Project Completion: Mar 23	



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October 2020 42

FY21 Science & Technology Innovation Center (CG-STIC) Tasks

Purpose: Establish a collaborative relationship between the U.S. Coast Guard Science & Technology Innovation Center and the Department of Homeland Security (DHS) Science and Technology Directorate (S&T) to share and advance technologies that will be mutually beneficial to both parties.

CG-STIC Funding Type: DHS S&T		RDC Research Lead: LCDR Anderson Ogg	CG-926 Domain Lead: Ms. Minh-Thu Phan	
STIC Note Title	Objective	Office Supported	Due/Delivery Date	
Remote Operated Life Saving Devices	<i>Support Search and Rescue (SAR) mission execution from shore-side and nearshore</i>	CG-SAR	Oct 20	
Mobile Tethered Video Systems	<i>Improve maritime domain awareness from land-based surveillance balloon</i>	CG-721	Oct 20	
Small Boat Wash Station	<i>Prevent environmental contamination by filtering wash water for spoils and releasing filtered water</i>	Alameda Naval Engineering	Nov 20	
Narcotic Ion Scan Technology	<i>Support counter drug missions by increasing the technical drug detection gear available to boarding team members</i>	CG-MLE	Jan 21	
Composite Impellers for P100 Pumps	<i>Reduce maintenance costs by using corrosion resistant composite materials</i>	SFLC ESD	Jan 21	
Handheld Forward-looking Infrared Technology	<i>Support small boat Ports, Waterways, and Coastal Security (PWCS) mission execution improvement by providing night time imaging</i>	CG-721	Feb 21	
Three-dimensional Sonar Evaluations	<i>Improve underwater situational awareness for various missions including PWCS, disaster recovery (Captain of the Port support), and SAR</i>	CG-721	Feb 21	
Inland Brush Cutter	<i>Improve aids to navigation mission execution and reduce injuries and crew downtime from poison ivy and snake bites</i>	D-8	Mar 21	
Light-emitting Diode Safety Lighting	<i>Improve safety in operations including firefighting and hoist operations using lighted collars around hoisting hooks</i>	CG-1131, ALC	May 21	
Narcotics Enforcement Go-Kits	<i>Support counter drug mission Presidential Order to increase operations in SOUTHCOM area of operations</i>	CG-721	May 21	
Laser Corrosion Removal	<i>Improve maintenance on boats and aircraft by using proven laser technology for corrosion removal</i>	SFLC ESD	Jul 21	
Autonomous Response Boat-Small	<i>Support PWCS mission in accordance with Commandant strategy to use unmanned and autonomous systems to conduct missions</i>	CG-731	Aug 21	
Diesel Outboard Engines	<i>Long term user evaluation to support single-fuel concept which will reduce cost due to efficient infrastructure by eliminating duplicate framework</i>	CG-731	Sep 21	

For more information, call (860) 271-2600 or e-mail RDC-Info@uscg.mil.



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FY21 Short Term Analytical Support Efforts

Purpose: Provide short term analytical support to CG decision makers with a means to access quick, inexpensive analyses to investigate a wide range of technology issues relating to current or planned CG operations or procurements. Larger analytical support projects will typically require funding to cover the cost of RDC labor & overhead and other direct costs.

Branch	Title	Objective	Office Supported	RDC POC	CG-926 Domain Lead	Due/Delivery Date
Surface	REACT Report: Rough Bar Illumination	<i>Identify low weight and low power lighting and how this lighting can be installed onto the Motor Lifeboat (MLB) platform to increase situational awareness during surf operations and rough bar escorts. The lights will enable crews to see the incoming waves and allow escorted vessels to better see the MLB to safely follow it through the rough bar conditions. Also investigate land-based lighting and improved flares to illuminate rough bars.</i>	CG-731 to support Coast Guard 47' MLB fleet	Mr. Brian Dolph	LT Steve Hager	Nov 20
Surface	Technical Note: Corrosion Control and Monitoring	<i>Detail the results of the Limited User Evaluation proposed in the Corrosion Roadmap and started under Project 7760, Corrosion Control and Monitoring. The Technical Note will document results achieved over a longer time period than was observable under the 7760 effort.</i>	CG-45, SFLC, CG-751	Mr. Brian Dolph	LT Steve Hager	Apr 22

For more information, call (860) 271-2600 or e-mail RDC-Info@uscg.mil.

