Acquisition Directorate
Research, Development, Test & Evaluation

U.S. Coast Guard
FY23 RDT&E
Project Portfolio

RDC Command Video: https://www.dvidshub.net/video/867068/coast-guard-rdc-overview

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

7691

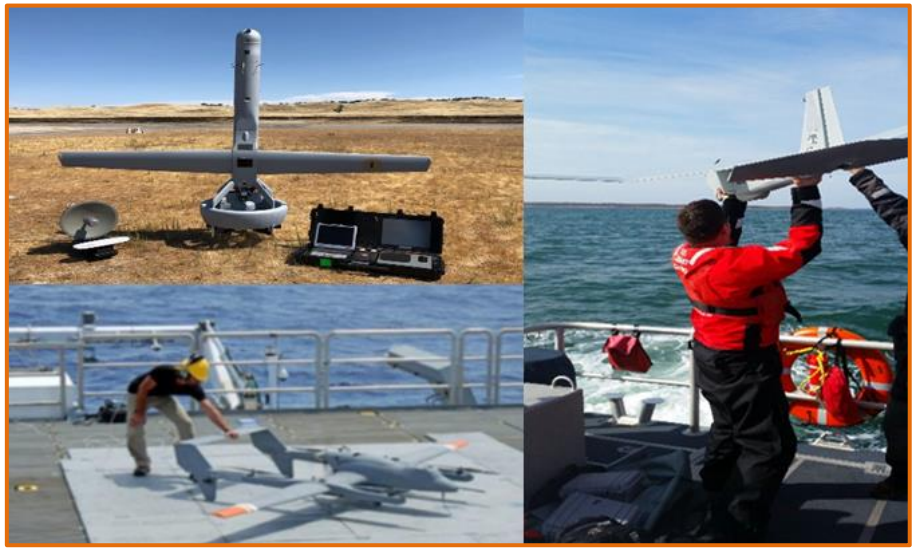
Mission Need: BVLOS operations for CG UAS.

Objectives

- Leverage U.S. Southern Command (SOUTHCOM), Joint Inter Agency Task Force-South (JIATF-S), and Navy Research Laboratory (NRL) efforts to explore Medium Range UAS (MR-UAS) Vertical Takeoff and Landing (VTOL) operations from a CG Cutter (CGC).
- Integrate Detect and Avoid (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 Medium Range-UAS Search and Rescue (SAR) demonstration, followed by a Limited User Evaluation (LUE) onboard a CGC.

Notes

- Legislative requirement.
- Establish Memoranda of Understanding and Cooperative Research and Development Agreements as necessary with industry partners.
- Leverage efforts of the U.S. Southern Command (SOUTHCOM), Federal Aviation Administration, National Oceanic and Atmospheric Administration, Office of Naval Research (ONR), Joint Interagency Task Force South (JIATF-S), U.S. Navy 4th Fleet and other government agencies.



Project Timeline / Key Milestones

Project Start: 13 Mar 19	
MR-UAS VTOL Operations from a CGC (Brief)	**9 Nov 20** ✓ ★
BVLOS Technologies Integrated into Small UAS (sUAS) and MR-UAS Complete	24 Dec 22 ✓
Detect and Avoid Technologies Integration (Brief)	**27 Jan 23** ✓ ★
Vessel-based sUAS BVLOS Limited User Evaluation D-7 Complete	Aug 23
Initial Vessel-Based MR-UAS DAA Technologies Demonstration Complete	Oct 23
Vessel-Based BVLOS MR-UAS VTOL Limited User Evaluation Complete	Apr 24
Combined Land-based BVLOS sUAS and MR-UAS SAR Demonstration Complete	May 24
Land and Vessel-Based BVLOS Demonstrations (Brief)	**Jul 24** ★
Beyond Visual Line of Sight UAS Operations (Report)	**Oct 24** ★
Project Completion: Oct 24	

Sponsor: CG-711	**Stakeholder(s):** CG-751, CG-931, CG-41, SOUTHCOM, JIATF-S, NRL, CGCYBER, ONR
RDC Research Lead: Mr. Stephen Dunn	**CG-926 Domain Lead:** Mr. Scott Craig
Anticipated Outcome/ Transition:	Recommendations for Acquisition Milestone Support Recommendations for Standards/Regulations/Policy

Maritime Uncrewed System Technology (MUST)

7820

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. Using modeling and simulation techniques, assess AUSV Concept of Operations, including:
  - Effectiveness of single and multiple AUSVs; and
  - Effectiveness of AUSV and unmanned aerial system teaming.
- Inform field testing using modeling analysis results.

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, Naval Surface Warfare Center – Dahlgren Division.

Sponsor: DHS S&T BIM, CG-26	**Stakeholder(s):** CG-721, CG-MLE, CGCYBER, FORCECOM
RDC Research Lead: Mr. Ross Vassallo	**CG-926 Domain Lead:** Mr. Scott Craig
Anticipated Outcome/ Transition:	Recommendations on Tech Availability & Applicability Recommendations for Tactics, Techniques & Procedures

Project Timeline / Key Milestones

Project Start: 1 Oct 19	
In House or Contracted Modeling KDP	23 Sep 20 ✓
Vehicle Operations and Control Training	20 Jun 21 ✓
Contract for Modeling Effort Established	14 Sep 21 ✓
MUST: Status Update (Brief)	**16 Aug 22** ✓ ★
Support for DHS MUST Operational Testing Completed	Sep 23
MUST: Model Progress Status (Brief)	**Sep 23** ★
MUST: Model Simulation Results (Brief)	**Sep 24** ★
Maritime Uncrewed System Technology (Report)	**May 25** ★
Project Completion: May 25	

Investigate Effects of Wind Farms on Search and Rescue (SAR)

1029

Mission Need: Research the impacts of wind farms on CG SAR.

Objectives

- Literature review and workshop with sponsor and stakeholders to determine current state of wind farms and SAR impacts.
- Collect and analyze real-time wind and current measurements to determine impact of changes due to wind turbines on wind farms with Leeway Drift Studies.
- Research, verify and implement Search and Rescue Optimal Planning System (SAROPS) wind farm updates.
- Conduct modeling and field tests to determine the impact to search object detection using prioritized sensors at US or United Kingdom (UK) based wind farm.

Notes

- Partnership with the National Oceanographic and Atmospheric Administration Integrated Ocean Observing System.
- Partnership with the Bureau of Ocean Energy Management.
- Partnership with the Bureau of Safety and Environmental Enforcement.
- International partners (United Kingdom, Denmark, Norway, Dutch, Sweden).
- Possible collaboration with State Maritime Academies.

Sponsor: CG-SAR

Stakeholder(s): NAVCEN, CG-NAV, CG-MER, CG-711/731/751/741/761, LANT, D1, FORCECOM

RDC Research Lead:
Ms. Shelly Wyman

CG-926 Domain Lead:
Mr. Scott Craig

Anticipated Outcome/ Transition: Recommendations for Tactics, Techniques & Procedures

Project Timeline / Key Milestones

Project Start: 3 Oct 22		
Complete Literature Review and Workshop	23 Feb 23 ✓	
UK Leeway Drift	24 Mar 23 ✓	
US Leeway Drifts: Pre – Construction of Turbines	Nov 23	
UK Leeway Drift Study Results (Report)	**Dec 23**	★
Detection Modeling	Mar 24	
US Leeway Drifts: Post -Construction	Apr 24	
Research, Verification, and Implementation for SAROPS Wind Farm Updates FY24 (Report)	**Oct 24**	★
Conduct Detection Experiments	Dec 24	
Detection Study Results (Report)	**May 25**	★
Research, Verification, and Implementation for SAROPS Wind Farm Updates FY25 (Report)	**Oct 25**	★
US Leeway Drift Results (Report)	**Jan 26**	★
Research, Verification, and Implementation for SAROPS Wind Farm Updates FY26 (Report)	**Oct 26**	★
Project Completion: Oct 26		

Aviation Branch Support

9992A

Mission Need: Maintain competency/knowledge; provide rapid response; and external liaison.

Objectives

- Maintain U.S. Coast Guard (CG) Research and Development Center (RDC) competency and technical knowledge in understanding present and future aviation and test and evaluation technology/systems including: manned and Unmanned Aircraft Systems (UAS), mission analysis, wide area surveillance, search and rescue, and persistent/strategic Maritime Domain Awareness (MDA).
- Maintain Branch infrastructure to support CG RDC portfolio objectives.
- Support Aviation Strategic Project Portfolio Alignment and CG DCO/DCMS Research Priorities.
- Provide expert input to CG stakeholders regarding aviation technologies.
- Foster continued relationships with CG sponsors/stakeholders and external U.S. Department of Defense labs, U.S. Department of Homeland Security (DHS) Science and Technology Directorate (S&T), and other government agency/academic partners.
- Provide service academy, Historically Black College or University, and Minority serving Institution students internship opportunities.

Notes

- Nexus for research and development unmanned efforts.
- Participating in CG Unmanned Systems Integrated Product Team (IPT).
- Participating in Medium Range UAS IPT and Small UAS Work Group.
- Sponsor for NPS Graduate Thesis Research on UAS integration.
- Partnered with SOUTHCOM research efforts.
- Partnered with CBP, FAA, NRL, NOAA, NASA BVLOS technology efforts.

Project Timeline / Key Milestones

Project Start: Ongoing	
Sector of the Future Support	Jun 24
FY24 Support	Sep 24
Joint Capability Technology Demonstration Wide-Area Autonomous Maritime Target Detect and Classification Technology Demonstration Support	TBD
Project Completion: Ongoing	

Sponsor: CG-926	**Stakeholder(s):** CG-41, CG-711, CG-721, CG-931, CG-SAR, ALC, DHS S&T
RDC Research Lead: Mr. Sean Lester	**CG-926 Domain Lead:** Mr. Scott Craig
Anticipated Outcome/ Transition: Various	

Modernizing Law Enforcement Encounter Background Checks at Sea

5602

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.
- Ensure alignment of efforts for modernization and compatibility with the new mobile MISLE application called ENFORCE.
- Enable a modernized, "plug-in" process for the background check functionality within the new ENFORCE mobile application.

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 U.S. Customs and Border Protection to explore technologies being used.
- Partner with CG-MLE Biometric project team to leverage parallel technologies for a one-solution-fits-all goal.

Sponsor: CG-MLE-2

Stakeholder(s): CG-25/26/6/721/761, ICC, CG-MSR LANT/PAC, CGIS, CGCYBER, C5ISC, FORCECOM, MLE-A

RDC Research Lead: Ms. Lauren Eberly

CG-926 Domain Lead: Ms. Holly Wendelin

Anticipated Outcome/ Transition: Recommendations for Tactics, Techniques & Procedures
Recommendations for Tech Availability & Applicability

Project Timeline / Key Milestones

Project Start: 1 Oct 20

Market Research Complete	28 May 21 ✓
Modernizing Law Enforcement Background Checks at Sea (Brief)	**8 Jul 21 ✓ ★**
Selected COA	7 Oct 21 ✓
Purchase Biometric/Document Scanner Devices	30 Jun 22 ✓
User Evaluation Testing Completed	21 Jul 22 ✓
Modernizing Law Enforcement Encounter Background Checks at Sea (Report)	**16 Nov 22 ✓ ★**

Project Completion: 16 Nov 22

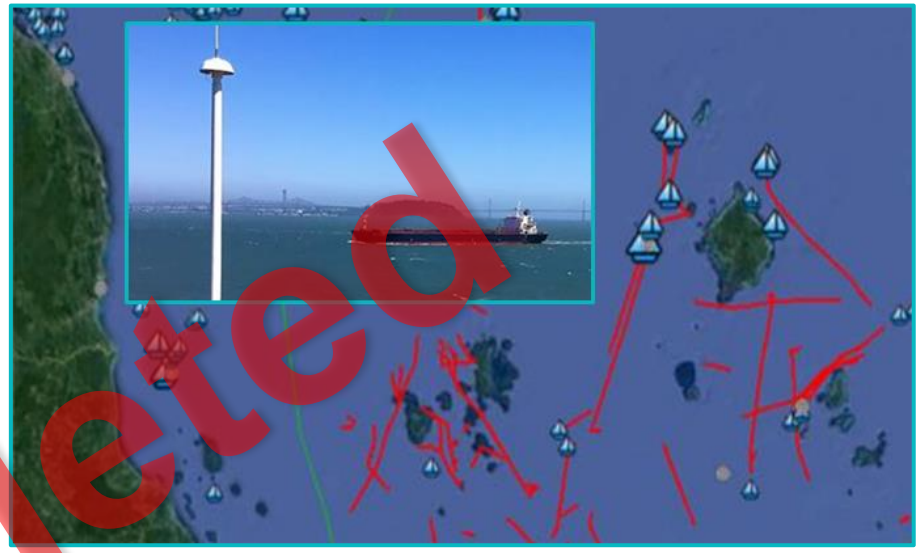
High Frequency (HF) Radar

8119

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

Objectives

- Assess High Frequency (HF) Radar tracking and communications capabilities of existing systems with government and commercial partners.
- Explore HF Radar applicability to U.S. Coast Guard (CG) missions and technology demonstration opportunities with partner organizations.
- Document current challenges with using HF Radar for CG Operations.



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 (NRL), U.S. Southern Command (SOUTHCOM), Joint Interagency Task Force-South (JIATF-S), and the Commander, USN 4th Fleet Science Advisor.

Completed

Sponsor: CG-761

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

RDC Research Lead:
Mr. Sekaran Jambukesan

CG-926 Domain Lead:
Ms. Holly Wendelin

Anticipated Outcome/ Transition: Recommendations on Tech Availability & Applicability

Project Timeline / Key Milestones

Project Start: 1 Oct 20

Completed HFSWR Capabilities Research	17 Mar 21 ✓
NRL Completed HF Data Collection, Analysis, and Report	3 Aug 21 ✓
High Frequency Radar Capabilities for MDA (Brief)	**12 Oct 21 ✓ ★**
Explore Technology Demonstration Opportunities	19 Aug 22 ✓
Investigate HF Radar Implementation Challenges	14 Sep 22 ✓
High Frequency Radar for CG Operations (Report)	**8 Mar 23 ✓ ★**

Project Completion: 8 Mar 23

Maritime Environmental Response Common Operating Picture

1009

Mission Need: Consolidate disparate data to modernize marine environmental response.

Objectives

- Leverage existing systems such as the National Oceanic and Atmospheric Administration's Environmental Response Management Application (ERMA) to create a central hubs of resources to improve response planning and operations.
- Work with the sponsor office and CGA to build a subsystem to ERMA to incorporate maritime environmental response actions and data layers.
- Connect maritime environmental response data from existing systems to the CG network to enable data fusion and overlay development.
- Collaborate with the ERMA program to create the Maritime Environmental Response (MER) Common Operating Picture (COP) to leverage existing system capabilities and create data overlays, such as chart based depictions of environmentally sensitive areas and legal or doctrinal constraints that could impact the response effort.

Notes

- This effort will also explore the iPAC system from the U.S. Fish and Wildlife services.

Sponsor: CG-MER

Stakeholder(s): CG-5R, CG-67, CG-68, CG-741, C5ISC, CGCYBER, CGA

RDC Research Lead:
Mr. Benjamin Berman

CG-926 Domain Lead:
Ms. Holly Wendelin

Anticipated Outcome/ Transition: Provide Sponsor/Product Line Tested Prototype

Project Timeline / Key Milestones

Project Start: 1 Oct 21	
Target Datasets Gathered	30 Jun 22 ✓
Oil Response Database Built	31 Aug 22 ✓
Integrate Datasets and Oil Response into Prototype	28 Oct 22 ✓
Complete Initial Prototype of Dashboard	8 Jan 23 ✓
Maritime Environmental Response Common Operating Picture Prototype (Brief)	**8 Jan 23** ✓ ★
Demo Initial Prototype of Dashboard	19 Jan 23 ✓
Test Dashboard and OILMAP Integration into ERMA	5 Apr 23 ✓
Demo Final Dashboard Prototype	6 Apr 23 ✓
Maritime Environmental Response Common Operating Picture (Report)	**Sep 23** ★
Project Completion: Sep 23	

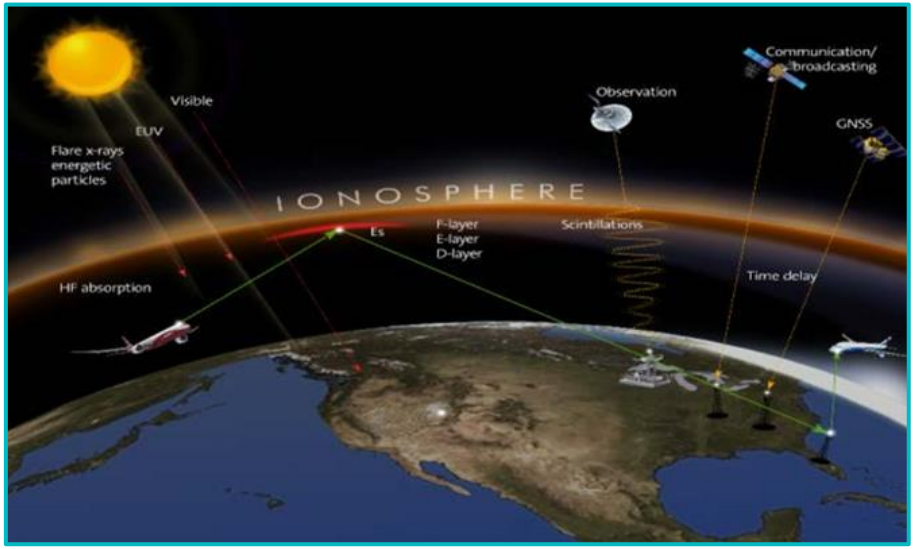
Mission-Specific Long-Range Communication Analysis

8504

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

Objectives

- Determine an optimized list of long-range communications (LRC) options for each U.S. Coast Guard (CG) mission in each area of operation, met with available or near-term available equipment. This will be accomplished by:
  - Developing a Beyond Line of Sight (BLOS) Cutter Survey and conducting focus group and site surveys in all districts for Fast Response Cutters (FRC) and larger assets.
  - Identifying baseline, new, and emerging long-range communications options to include technologies such as:
    - Low, medium, and High Frequency (HF).
    - Satellite communications (SATCOMMS).
    - 3G/4G/5G Automatic Link Establishment (ALE).
  - Developing a comprehensive matrix assessing the results of surveys and site visits by mission and geographic area.



Notes

- Leverage CG-761-developed Capabilities Based Assessment on current state of U.S. Coast Guard long-range communications.
- Share findings with Southern Command (SOUTHCOM) and Joint Interagency Task Force-South (JIATF-S) facilities and long-range communications capabilities and other potential U.S. Department of Defense research laboratories solutions as needed.
- Share findings with Naval Postgraduate School to identify long range communications collaboration opportunities.

Project Timeline / Key Milestones

Project Start: 1 Oct 20	
Long Range Communications Requirements Analysis	1 Jun 21 ✓
Cutter BLOS COMMS Survey Requirements	31 Jan 22 ✓
Mission-Specific Long-Range Communications Analysis (Brief)	**15 Mar 22 ✓ ★**
Cutter COMMS Focus Groups Survey	23 Oct 22 ✓
Cutter COMMS Site Visits	31 May 23 ✓
Long-Range Communications Matrix	Aug 23
Coordination with FORCECOM, SFLC, and COMMCOM	Oct 23
Mission-Specific Long-Range Communications Analysis (Report)	**Feb 24 ★**
Project Completion: Feb 24	

Sponsor: CG-761

Stakeholder(s): CG-68/751/791, C5ISSC, CGCYBR, JIATF-S, SOUTH/FORCE/COMMCOM, LANT, PAC

RDC Research Lead:
Mr. Mark Wiggins

CG-926 Domain Lead:
Ms. Holly Wendelin

Anticipated Outcome/ Transition: Recommendations for Tactics, Techniques & Procedures

Handheld Device Applications to Support Post-Storm Damage Assessments

1007

Mission Need: Accurate and timely field imagery and data from response teams.

Objectives

- Identify an efficient electronic means for field teams to quickly and accurately communicate data such as vessel damage assessments, Shoreline Cleanup Assessment and Technique forms, facility assessment forms for the Marine Transportation System Recovery Unit, Aids To Navigation verification, and other needed data.
- This effort will:
  - Assess existing mobile applications such as DAART, MAGE, TAK, ArcGIS, and Microsoft 365 mobile functionality.
  - Create a Damage Assessment tool for mobile field teams to use and evaluate after a major storm.
  - Determine the feasibility of connecting data and developing custom views in a Common Operating Picture (COP) such as Coast Guard One View, FirstNet dispatch console, and the Naval Research Laboratory's PROTEUS global Maritime Domain Awareness system.

Notes

- Explore the U.S. Army Space and Missile Defense Command's Domestic Operations Awareness and Assessment Response Tool (DAART), the National Geospatial-Intelligence Agency's (NGA) Mobile Awareness GEOINT Environment (MAGE), and the Team Awareness Kit (TAK) as potential Government Off-The-Shelf (GOTS) solutions.
- Consider partnerships with the National Oceanic and Atmospheric Administration (NOAA), Federal Emergency Management Agency (FEMA), and Natick Soldier Systems Center TAK lab.

Project Timeline / Key Milestones

Project Start: 1 Oct 21	
Complete Market Research	22 Jul 22 ✓
Complete Assessment of GOTS Mobile Solutions	30 Dec 22 ✓
Assessment of Handheld Device Applications to Support Post-Storm Damage Assessments (Brief)	**28 Feb 23 ✓ ★**
Complete Common Operating Picture Exploration	Sep 23
Complete Field Map Development and Testing	Dec 23
Handheld Device Applications to Support Post-Storm Damage Assessments (Technical Note)	**Mar 24 ★**
Project Completion: Mar 24	

Sponsor: CG-OEM	**Stakeholder(s):** CG-761/741/5R/67/68, CG-FAC, CG-MER, CG-NAV, C5ISC, CGCYBER
RDC Research Lead: Mr. Robert Coburn	**CG-926 Domain Lead:** Ms. Holly Wendelin
Anticipated Outcome/ Transition:	Provide Sponsor/Product Line Tested Prototype

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

7815

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 RDC Project 7812 "Maritime Counter Unmanned Aircraft Systems."

Sponsor: CG-MSR	**Stakeholder(s):** CG-711, CG-721, CG-751, LANT-3, PAC, D1, NSWC Dahlgren, AFRL, ONR, CGCYBER
RDC Research Lead: C-UAS Research Team	**CG-926 Domain Lead:** C-UAS Research Team
Anticipated Outcome/ Transition:	Provide Sponsor/Product Line Tested Prototype Recommendations for Acquisition Milestone Support

Project Timeline / Key Milestones

Project Start:

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

Project Completion:

Platform Cybersecurity Solutions for CG Cutters

1034

Mission Need: Cyber resilient Operational Technology (OT) systems on CG cutters.

Objectives

- Explore how the US Navy's Situational Awareness Boundary Enforcement and Response (SABER) program of record for ship/carrier cyber defense could be used to monitor CG Cutter (CGC) OT systems and protect against cyber threats.
- Survey CGC OT systems and determine how SABER could be integrated with the Coast Guard Machinery Control System (CGMCS) or another critical OT system to improve cutter cyber resiliency.
- Perform an analysis of SABER equipment operation and training. Determine frequency, personnel responsible, and program costs for patches, maintenance, and recurring support.
- Inform requirements for new acquisition systems to build cyber resiliency into future CG assets.

Notes

- Project pursues recommendations from RDC Project 8502 "Cybersecurity Vulnerabilities, Threats, and Risk Mitigation Strategies for Coast Guard Surface and Air Assets."
- Partner with Naval Sea Systems Command (NAVSEA) Cyber Engineering and Digital Transformation Directorate (SEA 03) to conduct a SABER proof-of-concept demonstration on a selected CGC OT system.
- Effort aligns with Cyber Strategic Outlook 2021 Line of Effort 1: Defend and Operate the Enterprise Mission Platform, by ensuring secure and resilient OT networks on CG assets to support all missions.

Sponsor: CG-791	**Stakeholder(s):** CGCYBER, CG-45, CG-68, CG-751, CG-932, CG-933, SFLC, C5ISC
RDC Research Lead: Ms. Lauren Eberly	**CG-926 Domain Lead:** Ms. Holly Wendelin
Anticipated Outcome/ Transition:	Recommendations for Product Line Tech Insertion Provide Sponsor/Product Line Tested Prototype

Project Timeline / Key Milestones

Project Start: 7 Dec 22	
SABER Exploration and Working Group Sessions with NAVSEA 03	29 Mar 23 ✓
CGC Asset Class and OT System Selection	13 May 23 ✓
CGC Hull Selection and Site Visit	Jul 23
SABER Hardware Procurements	Jul 23
SABER Lab Test and Data Collection	Oct 23
Pierside SABER Demonstration Iteration 1 with NAVSEA	Mar 24
SABER Proof-of-Concept Demonstration (Brief)	**Jul 24** ★
Data analysis and DAGGER development	Sep 24
Pierside SABER Demonstration Iteration 2 with NAVSEA	Oct 24
SABER Integration for CG Cutter Cybersecurity (Report)	**Mar 25** ★
Project Completion: Mar 25	

Alternate Navigation Positioning Sources

1035

Mission Need: Navigation alternatives for the Global Positioning System (GPS).

Objectives

- Jamming and spoofing of the critical GPS signal has been a risk for navigators for several years, particularly in restricted water transits.
- While the Department of Defense has developed several capabilities to identify and mitigate GPS jamming, capabilities are expensive and have had limited operational results.
- Understand and analyze the state of research, both within the U.S. and North Atlantic Treaty Organization, regarding navigation in GPS –degraded or –denied environments.

Notes

- Office of Naval Research Electro-optical/Infrared Celestial Navigation efforts ongoing.
- Leverage Naval Surface Warfare Center - Dahlgren ongoing work, U.S. Marine Corps Sky View effort, and related work completed by the U.S. Navy Four-Star Fleet.
- Coordinate with CG-NAV and CG Navigation Center (NAVCEN) Positioning, Navigation, and Timing Working Group on alternative solutions.
- Effort aligns with Cyber Strategic Outlook 2021 Line of Effort 2: Protect the Marine Transportation System.

Sponsor: CG-761	**Stakeholder(s):** CG-NAV, C5ISC, NAVCEN, CG-67, CG-68
RDC Research Lead: Mr. Benjamin Berman	**CG-926 Domain Lead:** Ms. Holly Wendelin
Anticipated Outcome/ Transition:	Provide Sponsor/Product Line Tested Prototype Recommendations on Tech Availability & Applicability

Project Timeline / Key Milestones

Project Start: 1 Apr 23

Perform Market Research	Apr 24	
Existing Alternatives for Navigation Positioning (Brief)	**Jul 24**	★
Select Course of Action	Aug 24	
Demonstrate Currently Available State of the Market Technology	May 25	
Alternate Navigation Positioning Technology Demonstration Results (Brief)	**Aug 25**	★
Develop Solution with Government Partners	Dec 25	
Demonstrate Government Developed Solution	Aug 26	
Alternate Navigation Positioning Sources (Report)	**Nov 26**	★

Project Completion: Nov 26

Command, Control, Communications, Computers, Cyber, & Intelligence (C5I) Branch Support

9991A

Mission Need: Maintain competency/knowledge; provide rapid response; and external liaison.

Objectives

- Maintain U.S. Coast Guard (CG) Research and Development Center (RDC) competency and technical knowledge in understanding present and future C5I systems, including: radio frequency communications, electronic navigation systems, software defined radios, cyber security systems, spectrum management, and sensors.
- Maintain Branch infrastructure to support RDC portfolio objectives.
- Support C5I Strategic Project Portfolio Alignment, CG Cyber Strategic Outlook initiatives, and CG DCO/DCMS Research Priorities.
- Provide expert input to CG stakeholders regarding C5I technologies.
- Foster continued relationships with CG sponsors/stakeholders and external U.S. Department of Defense (DOD) labs, U.S. Department of Homeland Security (DHS) Science and Technology Directorate (S&T), and other government agency/academic partners.
- Provide service academy, Historically Black College or University, and Minority Serving Institution students internship opportunities.

Notes

- Develop a "Sector of the Future" lab setup to assess how technology can transform Sector-level operational decision making and communications.
- Continue to provide Extended Reality subject matter expertise and technical support for HoloLens2 devices in support of RDC ITNET Branch.
- Support Polar Communications testing for RDC and DOD Labs collaborative projects.
- Participate with C5I organizations such as the Radio Technical Commission for Maritime Services (RTCM) and Institute of Navigation.

Sponsor: CG-926	**Stakeholder(s):** CG-2, CG-6, CG-7, CG-933, C5ISC, CGCYBER, DHS S&T
RDC Research Lead: Ms. Amy Cutting	**CG-926 Domain Lead:** Ms. Holly Wendelin
Anticipated Outcome/ Transition: Various	

Project Timeline / Key Milestones

Project Start: Ongoing	
RDC Human Subjects Research Internal Review Board SOP Tiger Team Support	24 Apr 23 ✓
AR/VR/XR Demonstration for Senior Leadership Conference	4 May 23 ✓
ION Joint Navigation Conference 2023	15 Jun 23 ✓
"Sector RDC" Lab Setup	Jul 23
Alien and Migrant Interdiction Operations (AMIO) Mobile Application and Tracking Requirements (REACT Report)	**Aug 23** ★
Support USCGC HEALY Cruise	Sep 23
C5I Centralized Community Training – R&D Panel	Sep 23
IUU Fishing Project Support	May 24
Active Membership in RTCM	Sep 24
Project Completion: Ongoing	

Ballast Water Management (BWM) Research and Development

4135

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 (BWMS) Type Approval (TA).
- Provide a tested Ballast Water Discharge Standard (BWDS) compliance tool to the field.
- Provide robust, science-based, shipboard-test technical protocols to validate IL test programs.
- Assess CG's Ballast Water Management Regulatory Program.

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 Outcome/ Transition: Recommendations for Standards/Regulations/Policy	

Project Timeline / Key Milestones

Project Start: 1 Oct 17

Delivered 3 Prior Year Products	FY17-21 ✓ ★
Assessing BWM and Invasions in the Great Lakes: Recommendation of Site Selection and Draft Protocol for Nonindigenous Species Sentinel Sites (Report)	17 Mar 22 ✓ ★
Assessing BWM and Invasions in Great Lakes: Site Selection and Draft Protocol for Shipboard Plankton Sampling at BW Sentinel Sites (Report)	31 Mar 22 ✓ ★
Functional Char. Compliance Monitoring Devices for BW Examinations (Report)	15 Nov 22 ✓ ★
Assessing BWM and Invasions In Great Lakes: Results of Year 1 Ballast Water Sampling and Sentinel Site Survey (2021) (Report)	1 Dec 22 ✓ ★
Initial Field Evaluation of Two Ballast Water Compliance Monitoring Devices (Report)	17 Feb 23 ✓ ★
Technical Guidance for the Use of Ballast Water Compliance Monitoring Devices (Report)	3 May 23 ✓ ★
Ballast Water Management Systems Type Approval; Oversight of Independent Laboratories and Sub-Laboratories (Report)	Jul 23 ★
Validation of Audit Protocols for Ship Tests by IL (Report)	Jul 23 ★

Project Completion: Jul 23

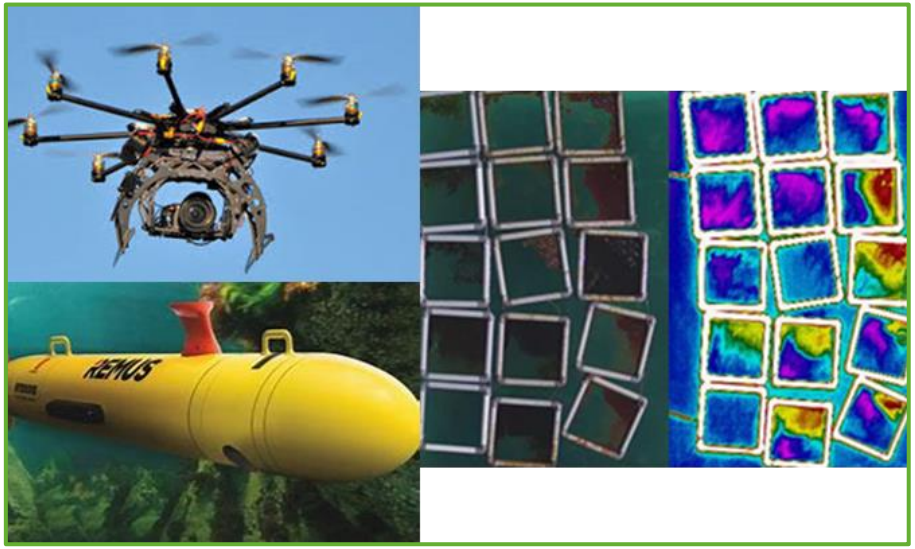
Advancing UAS and AUV Capabilities to Characterize Water Column and Surface Oil in Ice Environments

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 the 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's (NOAA) Office of Response and Restoration (OR&R), 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, CG-7 UxS
RDC Research Lead: Mr. Alexander Balsley, P.E.	**CG-926 Domain Lead:** Ms. Karin Messenger
Anticipated Outcome/ Transition:	Provide Sponsor/Product Line Tested Prototype Recommendations on Tech Availability & Applicability

Project Timeline / Key Milestones

Project Start: 23 Jan 20	
Interagency Reimbursable Work Agreement with NOAA	3 Jun 20 ✓
Phase 1: Unmanned Aircraft System (UAS)/Autonomous Underwater Vehicle (AUV) Tests at CRREL Complete	23 Apr 21 ✓
UAS and AUV Characterization of Oil in Ice; Laboratory Results And Way Ahead (Brief)	**6 Jul 21 ✓ ★**
UAS Characterization of Oil in Ice: Volumes I and II (Report)	**7 Feb 22 ✓ ★**
Field Exercise Planning Complete	18 May 22 ✓
Phase 2: UAS/AUV Systems Shore-Based Field Tests	3 Jun 22 ✓
Phase 2: UAS/AUV Systems Vessel-Based Field Tests	29 Jul 22 ✓
Data Schema for Data Export Complete	31 Oct 22 ✓
Advancing Detection Capabilities for Monitoring Oil Spills in Ice Environments (Report)	**Jul 23 ★**
Project Completion: Jul 23	

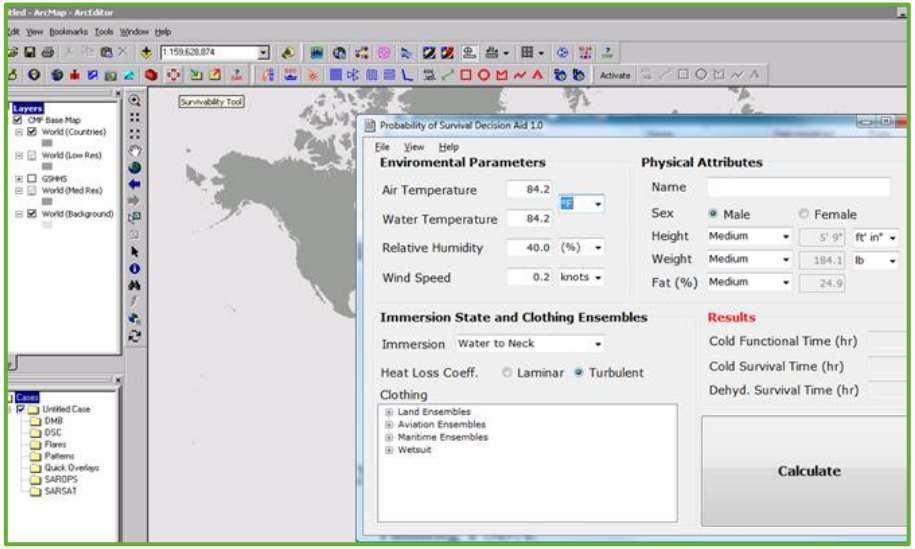
Survival Modeling, Reporting, and Statistics

1008

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 including the U.S. Naval Experimental Diving Unit (NEDU), U.S. Army Research Institute of Environmental Medicine (USARIEM), and U.S. Navy Clothing and Textile Research Facility.

Sponsor: CG-SAR	**Stakeholder(s):** CG-5R, CG-761, C5ISC, FORCECOM
RDC Research Lead: Ms. Monica Cisternelli	**CG-926 Domain Lead:** Ms. Karin Messenger
Anticipated Outcome/ Transition:	Recommendations for Tactics, Techniques & Procedures Recommendations for Standards/Regulations/Policy

Project Timeline / Key Milestones

Project Start: 1 Nov 17	
Investigated Requirements and Applications	30 Apr 18 ✓
Investigated State of Survival Models	6 Jul 19 ✓
Conducted Facilitated Workshop	28 Aug 19 ✓
Completed Survival Statistics Brief	16 Dec 19 ✓
Completed Key Decision Point to Progress to Model Implementation	2 Sep 20 ✓
Enhanced USCG Survival Model & Implementation (Brief)	**30 Nov 20** ✓ ★
Complete Clothing Studies	18 Mar 22 ✓
Complete Pilot NEDU Immersion Tests	24 Jun 22 ✓
Complete NEDU Immersion Tests	6 Sep 22 ✓
Complete USARIEM Data Analysis	30 Mar 23 ✓
Enhanced USCG Survival Model and Implementation Guidance (Report)	**Jul 23** ★
Project Completion: Jul 23	

Behavior of Diluted Bitumen (Dilbit) in Fresh Water

4204

Mission Need: Enhanced decision-making for response to dilbit spills in the fresh water environment.

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 (GL) Restoration Initiative funding.
- Leverage RDC 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, D9

Stakeholder(s): EPA GL Nat’l Program Office/ Pollution Response Office, LANT-54, NOAA, FORCECOM

RDC Research Lead: Benedette Adewale, PhD

CG-926 Domain Lead: Ms. Karin Messenger

Anticipated Outcome/ Transition: Recommendations for Tactics, Techniques & Procedures

Project Timeline / Key Milestones

Project Start: 1 Oct 20

Literature Review Complete	12 Feb 21 ✓
Literature Review – Diluted Bitumen in the Fresh Water Environment (Report)	**23 Jun 21 ✓ ★**
Dilbit Test Plan Complete	30 Sep 21 ✓
CRREL Dilbit Weathering Cold Weather Test Complete	30 Nov 21 ✓
CRREL Dilbit Weathering Warm Weather Test Complete	15 Jul 22 ✓
CRREL Dilbit Weathering Ice-free Cold Weather Test Complete	15 Nov 22 ✓
Dilbit Oil Analysis Complete	30 Jan 23 ✓
Guidance Document - Behavior of Diluted Bitumen in the Fresh Water Environment (Report)	**Aug 23 ★**

Project Completion: Aug 23

Private Aids to Navigation Verification Improvements

1020

Mission Need: Modernize the Auxiliary reporting system for PATON verification.

Objectives

- Automate and standardize data collection for Private Aids to Navigation (PATON).
- Research how each District performs and records PATON verification.
- Evaluate and develop potential solutions to increase efficiency and effectiveness.
- Standardize how the U.S. Coast Guard (CG) documents PATON verification.
- Transition results to the Office of Navigation (CG-NAV) for implementing a service-wide PATON verification tool.

Notes

- RDC Auxiliary Unit to coordinate national participation for project execution.
- Leverage existing, Auxiliary-developed PATON verification tools and processes.
- Capitalize on Auxiliarist information technology capability for mobile-application development.
- Partner with National Oceanic and Atmospheric Administration and United States Army Corps of Engineers.

Sponsor: CG-NAV	**Stakeholder(s):** CG Auxiliary, Districts, NAVCEN, CG-68
RDC Research Lead: Mr. James Spilsbury	**CG-926 Domain Lead:** Ms. Karin Messenger
Anticipated Outcome/ Transition: Provide Sponsor/Product Line Tested Prototype	

Project Timeline / Key Milestones

Project Start: 1 Oct 21

Complete Market Research	30 Nov 21 ✓
Complete Defining Functional Characteristics	7 Dec 21 ✓
Key Decision Point #1 - Decision on PATON Tool	7 Dec 21 ✓
Private Aids to Navigation Improvements Project Status (Brief)	**2 Feb 22 ✓ ★**
Complete Prototype Design	16 Aug 22 ✓
Key Decision Point #2 - CG Approval of Design	16 Aug 22 ✓
Complete Testing of Prototype	15 May 23 ✓
Private Aids to Navigation Verification Improvements (Report)	**Sep 23 ★**

Project Completion: Sep 23

Emerging Pollution Response Technology Evaluation

1011

Mission Need: Understand the capability of emerging mechanical pollution-response technology.

Objectives

- Conduct market research to identify new and emerging pollution response technologies.
- Conduct independent evaluation of select technologies using the U.S. Coast Guard's (CG) Oil Spill Response Technology Evaluation Process.
- Collaborate with other Federal agencies (Bureau of Safety and Environmental Enforcement (BSEE), Environmental Protection Agency, etc.) to conduct in-water testing of the most promising technologies.
- Provide feedback to equipment providers for consideration in advancing their technologies to enhance the nation's pollution response capability.
- Provide a knowledge product for Federal On-Scene Coordinator (FOSC) awareness of new technologies.

Notes

- Oil Spill Liability Trust Fund funding.
- Partnership with BSEE.
- Possible use of Cooperative Research and Development Agreements.
- Opportunity to partner with Interagency Coordinating Committee for Oil Pollution Research (ICCOPR) members, Federal Laboratory Consortium members, and academic institutions involved in this area of research.
- Possible collaboration with Blue Technology Center of Expertise (BTCOE) for technology market research.

Project Timeline / Key Milestones

Project Start: 1 Oct 21	
Request for Information (RFI) Issued for Sorbents	5 Jan 22 ✓
In-house Technology Evaluation Conducted	17 May 22 ✓
Emerging Pollution Response Technology (Sorbents), Preliminary Evaluation Results/Way Forward (Brief)	**13 Jul 22 ✓ ★**
Ohmsett Testing of Sorbents Complete	28 Oct 22 ✓
Emerging Pollution Response Technology: Adsorbents (Report)	**28 Jun 23 ✓ ★**
Ohmsett Testing of Mech Recovery Complete	Nov 23
Emerging Pollution Response Technology (Mechanical Recovery/Containment), Evaluation Findings (Report)	**Jun 24 ★**
Project Completion: Jun 24	

Sponsor: CG-MER

Stakeholder(s): ICCOPR, CG-721, District Response Advisory Teams, FOSCs, National Strike Force

RDC Research Lead:
Mr. Alexander Balsley, P.E.

CG-926 Domain Lead:
Ms. Karin Messenger

Anticipated Outcome/ Transition: Recommendations on Tech Availability & Applicability

Hazardous Substance Pollution Response Technology Analysis

1033

Mission Need: Improve response readiness to hazardous substance pollution release incidents.

Objectives

- Address hazardous substance pollution risk knowledge gaps in Area Contingency Plans.
- Identify and analyze existing hazardous substance response technologies, capabilities, and resources.
- Provide reference guidance for area contingency planners.
- Enhance Captain of the Port (COTP) and Federal On Scene Coordinators (FOSC) response capabilities.
- Support inclusion of hazardous substance release response resources in facility and vessel response plans.

Notes

- Coordinate with area contingency planners to connect project focus with specific field needs.
- Engage with the U.S. Environmental Protection Agency (EPA) emergency response program, CG National Strike Force Coordination Center (NSFCC), firefighters and other local hazardous-materials responders to leverage existing hazardous substance pollution response expertise.

Sponsor: CG-MER

Stakeholder(s): EPA, NSFCC, FAC, NCR

RDC Research Lead:
Benedette Adewale, PhD

CG-926 Domain Lead:
Ms. Karin Messenger

Anticipated Outcome/ Transition: Recommendations for Tactics, Techniques & Procedures

Project Timeline / Key Milestones

Project Start: 3 Oct 22

Complete COTP/FOSC/Other Agency Information Gathering.	Aug 23
Hazardous Substance Materials Incident Literature Review and Identification of Hazardous Substance Materials Locations (Report)	**Sep 23** ★
Complete Request for Information Review/Research of Available Technology among Other Agencies and First Responders	Nov 23
Technologies for Hazardous Substance Pollution Incident Response Market Research (Report)	**Jun 24** ★

Project Completion: Jun 24

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.
- Develop an inland ERSP calculator prototype tool.
- Validate ERSP calculator functionality and usefulness through an independent evaluation by a group of National Academies of Sciences, Engineering, and Medicine reviewers.

Notes

- Oil Spill Liability Trust Fund funding.
- Partnership with Bureau of Safety and Environmental Enforcement (BSEE).
- Transition partnership with Great Lakes National Center of Expertise.

Sponsor: CG-MER

Stakeholder(s): BSEE, AREAs

RDC Research Lead:
Mr. Alexander Balsley, P.E.

CG-926 Domain Lead:
Ms. Karin Messenger

Anticipated Outcome/ Transition: Provide Sponsor/Product Line Tested 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)	**29 Jun 20 ✓ ★**
Initial Development of Inland ERSP Calculator Complete	4 Jun 21 ✓
National Academy of Sciences (NAS) Review Complete	9 Sep 22 ✓
NAS Recommended ERSP Calculator Updates Complete	May 24
Inland Evaluation of the ERSP Calculator (Prototype & User Guide)	**Sep 24 ★**
Project Completion: Sep 24	

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

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 ✓ ★**
Industry Day Webinar Complete	25 May 21 ✓
DHS Issues BAA	21 June 21 ✓
Interim Brief Complete	28 Sep 21 ✓
MRLSA: Phase 1 Consensus Results (Brief)	**30 Mar 22 ✓ ★**
DHS Contract Award	12 Sep 22 ✓
Prototype Development Complete	Feb 24
MRLSA Phase 1 Testing and Key Decision Point (Brief)	**Jun 24 ★**
Phase 2 Testing	Jul 24
Mass Rescue Lifesaving Appliance (Report)	**Sep 24 ★**
Project Completion: Sep 24	

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 Outcome/ Transition:	Provide Sponsor/Product Line Tested Prototype Recommendations for Standards/Regulations/Policy

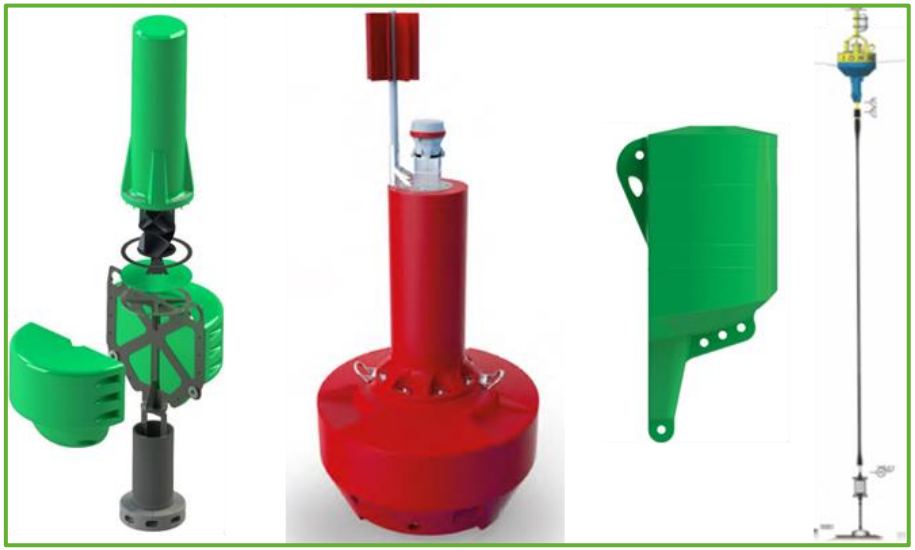
Next Generation Aids to Navigation Buoys & Alternative Moorings

2703

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

Objectives

- Determine the world-wide state of non-ferrous, Next Generation (Next Gen) 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.
- Analyze buoy inventory to identify logistical and operational inefficiencies.
- Develop science-based, analytical tool to aid CG managers with future inventory decisions.
- Field trial and evaluate promising inland river buoy alternatives.
- Evaluate the radar signatures of legacy and Next Gen buoy designs.
- Evaluate mooring analysis software replacement options.



Notes

- Coordinate with CG-NAV and the Data Center Optimization Initiative to involve to involve International Association of Marine Aids to Navigation and Lighthouse Authorities as partners.
- Collaborate with Naval Sea Systems Command on buoy radar cross section and detection ranges analysis.
- Coordinate with CG-68 on the transition of MOORSEL replacement.

Sponsor: SILC-WOPL

Stakeholder(s): CG-NAV, Districts (dpw), CG-68

RDC Research Lead:
Mr. James Spilsbury

CG-926 Domain Lead:
Ms. Karin Messenger

Anticipated Outcome/ Transition: Recommendations for Acquisition Milestone Support
Recommendations for Product Line Tech Insertion

Project Timeline / Key Milestones

Project Start: 1 Oct 19

Complete World Wide Market Study of Buoys	31 Mar 20 ✓
Next Gen ATON Buoys: Market Study Report (Report)	**17 Sep 20 ✓ ★**
Draft Test Plan for Buoys and Moorings Complete	20 Oct 20 ✓
Next Gen ATON Buoys - Field Test Update (Brief)	**12 Aug 21 ✓ ★**
ATON Buoy Inventory Analysis Tool Development (Brief)	**15 Jun 22 ✓ ★**
Inland River Buoy Field Testing Status (Brief)	**9 Jan 23 ✓ ★**
Mooring Analysis Software and Radar Reflector Update (Brief)	**20 Mar 23 ✓ ★**
Field Test for Buoys and Moorings Complete	10 May 23 ✓
New Buoy and Moorings Field Trial Summary (Report)	**Jul 23 ★**
ATON Buoy Optimization Tool (Tool & User Guide)	**Dec 23 ★**
Mooring Analysis Software and Radar Reflector Summary (Report)	**Sep 24 ★**

Project Completion: Sep 24

Evaluate Visibility of Colors for CG Approved Lifesaving Equipment in Marine Conditions

1032

Mission Need: Optimal lifesaving equipment detectability.

Objectives

- Conduct literature review of High Visibility Safety Apparel (HSVA) and lifesaving equipment visibility/probability of detection research.
- Carry out industry/professional society review of standards for HSVA and Search and Rescue (SAR) equipment colors and/or color schemes.
- Perform domestic and international governmental review of approved/required colors in SAR scenarios.
- Define optimal visual detectability and conspicuity color characteristics in marine conditions via a marine environment high visibility color standard.
- Conduct field trials to validate high visibility color standard from shore, afloat and aviation assets in various weather, light and sea-state conditions.
- Provide findings to project sponsor and stakeholders for use in lifesaving equipment color evaluations and standards revision, if appropriate.

Notes

- Engage CG RDC vision research subject matter experts to leverage in-house expertise, as well as CG Auxiliary for experimentation support.
- Review previous RDC visibility, visual distress signal, and detectability projects for experiment techniques, findings and conclusions.
- Global maritime stakeholders review results, revisit and revise domestic and international policy and regulations, if appropriate.
- U.S. Department of Defense, North Atlantic Treaty Organization, and Cruise Lines Industry Association interest.

Sponsor: CG-ENG	**Stakeholder(s):** CG-BSX, CG-5P, CG-5R, CG-711, CG-731, CG-751, WOPL, NMC, NBSAC, IMO NCSR
RDC Research Lead: Mr. Josh Pennington	**CG-926 Domain Lead:** Ms. Karin Messenger
Anticipated Outcome/ Transition:	Recommendations for Standards/Regulations/Policy

Project Timeline / Key Milestones

Project Start: 3 Oct 22	
Technical Review	8 Mar 23 ✓
Lifesaving Equipment Colors; Literature Review (Report)	**Jul 23** ★
Research & Define Color Characteristics	Oct 23
KDP – Sponsor Concurrence on Color Characteristics	Feb 24
Objective Metrics for Color Characteristics of CG Approved Lifesaving Equipment (Report)	**Feb 24** ★
Field Trial Test Plan	Apr 24
Field Trials Complete	Feb 25
Data Analysis Complete	Apr 25
Visibility of Potential Colors for CG Approved Lifesaving Equipment (Report)	**Sep 25** ★
Project Completion: Sep 25	

Environment & Waterways (E&W) Branch Support

9993A

Mission Need: Maintain competency/knowledge; provide rapid response; and external liaison.

Objectives

- Maintain U.S. Coast Guard (CG) Research and Development Center (RDC) competency and technical knowledge in understanding present and future E&W technology, systems, and regulatory directives/policies, including: environmental protection, pollution detection/response, ballast water standards, marine and navigation safety Improvements, and search and rescue improvements.
- Maintain Branch infrastructure to support RDC portfolio objectives.
- Support E&W Strategic Project Portfolio Alignment and CG DCO/DCMS Research Priorities.
- Provide expert input to CG stakeholders regarding E&W technologies.
- Foster continued relationships with CG sponsors/stakeholders and external U.S. Department of Defense labs, U.S. Department of Homeland Security (DHS) Science and Technology Directorate (S&T), and other government agency/academic partners.
- Provide service academy, Historically Black College & University, and Minority Serving institution students internship opportunities.

Notes

- Distress Signals Policy Council & Radio Technical Commission for Maritime Services meetings and special committees.
- Interagency Coordinating Committee on Oil Pollution Research (ICCOPR)
- Great Lakes Oil Spill Center of Expertise liaison.
- CG-SAR/CGA leeway drift collaboration.
- National Oceanic & Atmospheric Administration Response Oil Assay Work Group.
- Long Range Autonomous Underwater Vehicle training and familiarity for non-hydrocarbon detection CG missions.

Sponsor: CG-926	**Stakeholder(s):** CG-5, CG-SAR, CG-MER, CG-ENG, CG-OES, D9, D11, DHS S&T
RDC Research Lead: Mr. M. J. Lewandowski	**CG-926 Domain Lead:** Ms. Karin Messenger
Anticipated Outcome/ Transition: Various	

Project Timeline / Key Milestones

Project Start: Ongoing

Great Lakes Oil Spill National Center of Expertise Coordination Meeting	27 Oct 22 ✓
ICCOPR Quarterly Meeting	14 Dec 22 ✓
California Office of Spill Prevention and Response Technical Workshop	28 Mar 23 ✓
BSEE/NOAA Shoreline Response Workshop	11 May 23 ✓
Leeway Drift Study	Jul 23

Project Completion: Ongoing

Internet Protocol (IP) Video Compression across CG Communication Networks

1012

Mission Need: Hardware and software solutions to facilitate real-time video transmission.

Objectives

- Research available technologies to provide the U.S. Coast Guard (CG) fleet the ability to broadcast real-time video to increase operational capabilities, improve decision making and tactical planning, enhance common operating picture, and provide reliable evidence building for drug interdiction and law enforcement cases.
- Develop recommendations for USCG IT architecture to support sponsor and key stakeholders concerning best means of improving USCG IT architecture to support IP video compression across all CG communications networks.

Notes

- Research U.S. Navy, Special Forces and U.S. Department of Homeland Security components IP video compression architectures.
- Interview CG Boarding Team (BT)/Law Enforcement Detachment, U.S. Department of Defense, U.S. Department of Justice, U.S. 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-25/721/741/751/68/67, C5ISC, TACLETs, CGCYBER, MLE-A, AREAs
RDC Research Lead: Mr. David Cote	**CG-926 Domain Lead:** Ms. Holly Wendelin
Anticipated Outcome/ Transition:	Recommendations for Acquisition Milestone Support

Project Timeline / Key Milestones

Project Start: 1 Oct 21

CG Previous/Current Technical Efforts Reviewed	31 Dec 21 ✓
Market Research of Video Compression Technology Completed	28 Feb 22 ✓
Initial Video Compression Functional Characteristics Documented	31 Aug 22 ✓
Internet Protocol Video Compression across CG Communications Networks: Results and Recommendations (Report)	**Jul 23** ★

Project Completion: Jul 23

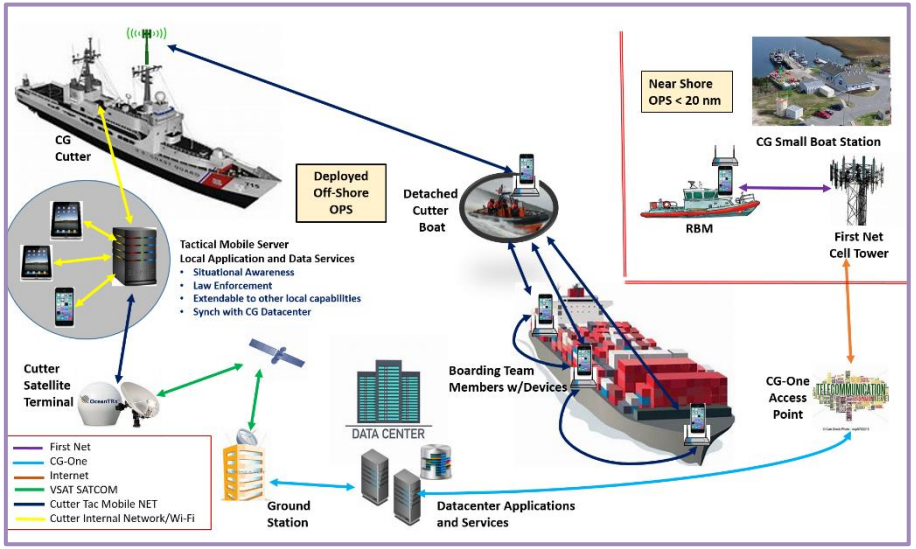
Operational Mobile Technology Architecture

8704

Mission Need: Improve DSF and Cutter boarding team safety, security, and mission efficiency.

Objectives

- Define protected, standards based mobile architectures to interface with U.S. Coast Guard (CG) Maritime and Avionic Systems.
- Phase 1:
  - Document and provide undocumented Deployable Specialized Forces (DSF) and Boarding Team (BT) requirements to sponsors/stakeholders.
  - Deliver best in class ranking of COTS and GOTS tactical mobile technology market research to support fast CG technology transition and integration.
- Phase 2:
  - Validate Market Research data through Limited User Evaluation of best-in-class tactical mobile technologies.
  - Deliver best in class solution architecture roadmap options to sponsor & stakeholders.
  - Deliver Improved DSF/Cutter BT Efficiency Report to key decision makers to drive CG wide change.
  - Examine use of LiDAR, Hazard Warning, and Biometrics Technology by BT members and how technology is integrated into Tactical Comm's Toolkit.



Notes

- Partner with the Air Force Institute of Technology (AFIT) to leverage systems engineering modeling capability.
- Research U.S. Navy, Special Forces and U.S. Department of Homeland Security (DHS) components tactical mobile communications architectures.
- Interview CG BT/Law Enforcement Detachment, U.S. Department of Defense, U.S. Department of Justice, DHS, and BT policy makers to identify functional characteristics in an ideal and an acceptable scenario.
- Potential collaboration with the Naval Post Graduate School (NPS) Initial Research Estimate Form (IREF) compressed video request.

Sponsor: CG-761	**Stakeholder(s):** CG-67/68/721/751/932, CG-MLE LANT, PAC, C5ISC, CGCYBER, TACLETS, NPS, AFIT
RDC Research Lead: Mr. David Cote	**CG-926 Domain Lead:** Ms. Holly Wendelin
Anticipated Outcome/ Transition:	Provide Sponsor/Product Line Tested Prototype and Recommendations for Product Line Tech Insertion

Project Timeline / Key Milestones

Project Start: 1 Oct 20	
Interviews w/CG Cutter BTs and Policy Makers Completed	23 Dec 20 ✓
Tactical Mobile COTS/GOTS Tech Evaluation Completed	31 Mar 21 ✓
Operational Mobile Technology Architecture Market Research (Brief)	**18 Aug 21** ✓ ★
Selected MANET/LTE Technology Limited User Evaluation Completed	31 Oct 22 ✓
Tactical Mobile Technology Evaluation (Brief)	**6 Mar 23** ✓ ★
Tactical Team Enhancement Tools (LiDAR, Hazard Warning, Biometrics, BT Toolkit) Evaluations Completed	31 Mar 23 ✓
Tactical Team Enhanced Toolkit/Tools Evaluation (Brief)	**17 Apr 23** ✓ ★
Improve Deployable Specialized Forces and Cutter Boarding Team Efficiency (Report)	**Jul 23** ★
Project Completion: Jul 23	

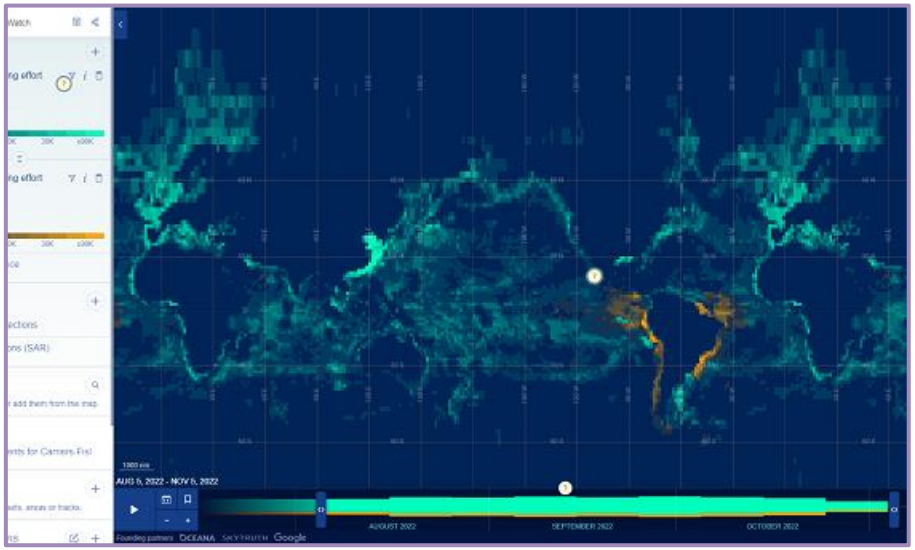
ArcGIS Enterprise Integration of IUU Fishing Detection Information

1006

Mission Need: Integrate and display IUU fishing activity for Maritime Law Enforcement operations.

Objectives

- Determine requirements for Illegal, Unreported and Unregulated Fishing (IUUF) Activity detection and display.
- Determine existing and needed sources/sensors/inputs for IUU Fishing display on an Environmental Services Research Institute (ESRI) platform.
- Investigate creation of an ESRI platform that captures and manages data input for C-IUUF.
- Create repeatable and adaptable process for all geographic locations that support C-IUUF.



Notes

- Leverage previous RDC and Maritime Intelligence Fusion Center IUU work as much as possible.
- Explore the link between historical and real-time data within the ESRI system.
- Identify how content and format of data sources come together within the ESRI system. Determine what kind of information would increase system effectiveness.
- Explore SeaVision as a potential option for external GIS.

Sponsor: CG-MLE	**Stakeholder(s):** CG-2, CG-68, PACAREA, MIFC LANT/PAC, ICC, D14, D17, CGCYBER
RDC Research Lead: Mr. Jack Cline	**CG-926 Domain Lead:** Ms. Holly Wendelin
Anticipated Outcome/ Transition:	Recommendations on Tech Availability & Applicability Provide Sponsor/Product Line Tested Prototype

Project Timeline / Key Milestones

Project Start: 1 Oct 21

AIS Data Quality/ Analysis Investigation	31 Aug 22 ✓
IUU Requirements Determined	16 Dec 22 ✓
ArcGIS Data Integration Status Update (Brief)	**29 Mar 23 ✓ ★**
First Round Prototype Development	Nov 23
Prototype Demonstration	Dec 23
Prototype Revision	Jan 24
The Use of ArcGIS to Detect and Display IUU Fishing Activity (Brief)	**May 24 ★**
The Use of ArcGIS to Detect and Display IUU Fishing Activity (Report)	**May 24 ★**

Project Completion: May 24

Extended Reality (XR) Capabilities for Coast Guard Mission Support

8107

Mission Need: Improve efficiency and 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 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):** ALC, ATTC, CGA, SFLC, MSC, CG-1B3/ 41/45/5PC/67/751/761/933, TRACEN Yorktown, MSC
RDC Research Lead: Mr. Jack Cline	**CG-926 Domain Lead:** Ms. Holly Wendelin
Anticipated Outcome/ Transition:	Recommendations on Tech Availability & Applicability Recommendations for Tactics, Techniques & Procedures

Project Timeline / Key Milestones

Project Start: 30 Nov 17	
Market Research/Technology Assessment (Brief)	**19 Dec 18** ✓ ★
HoloLens 2 Upgrade Completed	3 Sep 20 ✓
87' WPB Augmented Reality Maintenance Prototype	18 Sep 19 ✓
Aviation Augmented Reality Maintenance Prototype	2 Feb 21 ✓
Limited User Evaluation - Surface Community (Brief)	**20 Apr 21** ✓ ★
Marine Inspection XR Training Prototype Delivered	31 Jan 22 ✓
Limited User Evaluation - Aviation Community (Brief)	**18 Aug 22** ✓ ★
Limited User Evaluation - Training Community (Brief)	**16 Sep 22** ✓ ★
Extended Reality Capabilities for Coast Guard Mission Support: Transition Issues (Brief)	**Oct 23** ★
Mission Support XR Roadmap Complete	Nov 23
XR Capabilities for CG Mission Support (Report & Brief)	**May 24** ★
Project Completion: May 24	

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

8703

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.
- Develop AIS/VDES-transmit application to disseminating SAROPS search patterns.
- Assess technical limitations of VDES R-Mode to include reliability and accuracy.
- Assess feasibility of VDES R-Mode implementation in the United States.
- Investigate the ability to use VDES R-Mode to detect position spoofing efforts by bad actors.

Notes

- Work closely with the Canadian Coast Guard; Electronics and Information Services, Quebec; U.S. Army Corps of Engineers, Engineer Research & Development Center.
- Leverage prior CG Research and Development Center work completed concerning options and impacts for VDES and AIS.

Project Timeline / Key Milestones

Project Start: 1 Oct 19	
Technology Roadmap Investigation Complete	30 Sep 20 ✓
Very High Frequency Data Exchange System (VDES) Technology Roadmap (Report)	**27 Jan 21** ✓ ★
Test Plan-Equipment Integration- Lab Test Complete	5 Mar 21 ✓
Phase 1 Field Trials – VDES Evaluation of CG Tactical Data Transmission	1 Oct 21 ✓
Sensitive but Unclassified Tactical Information Exchange and Display System Using VDES (Report)	**13 Dec 21** ✓ ★
Phase 2 Field Trials – VDES Evaluation of the Dissemination of MSI	8 Dec 22 ✓
Key Decision Point for Phase 3	28 Dec 22 ✓
Disseminating MSI Using VDES Field Trial Summary (Report)	**22 Mar 23** ✓ ★
Phase 3 Field Trials – VDES Evaluation of R-Mode	Jun 24
VDES Ranging Mode Field Trial Summary (Report & Brief)	**Sep 24** ★
Project Completion: Sep 24	

Sponsor: CG-761

Stakeholder(s): CG-67, CG-68, CG-933, CG-NAV, NAVCEN, C5ISC, CGCYBER

RDC Research Lead:
Mr. James Spilsbury

CG-926 Domain Lead:
Ms. Holly Wendelin

Anticipated Outcome/ Transition: Recommendations for Standards/Regulations/Policy

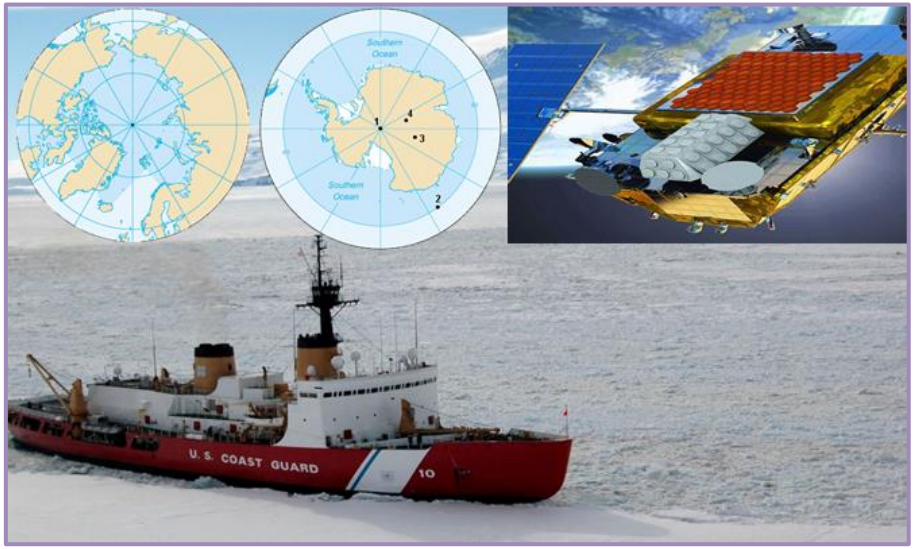
High Latitude Underway Connectivity

8705

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 (DoD) High Latitude (Hi-Lat) research projects within last 10 years, including U.S. Navy (USN) 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 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 U.S. Department of Homeland Security Science and Technology Directorate Office of University Programs; USN Stratospheric Community of Interest; and Command, Control, Communications, Computers, Cyber, and Intelligence Service Center (C5ISC) Deployed Connectivity Section.
- Align with C5ISC SATCOM procurement.
- Link with DoD Lab Sync Arctic Comms effort and International Cooperative Engagement Program for Polar Research.

Sponsor: CG-761	**Stakeholder(s):** CG-67, CG-68, CG-751, CG-762, LANT/PAC-6, C5ISC, ALC, CGCYBER
RDC Research Lead: Mr. Jon Turban, P.E.	**CG-926 Domain Lead:** Ms. Holly Wendelin
Anticipated Outcome/ Transition: Provide Sponsor/Product Line Tested Prototype	

Project Timeline / Key Milestones

Project Start: 1 Oct 20

Review of Previous Projects and Research Complete	18 Mar 21 ✓
High Latitude Satellite Systems Market Research Complete	18 Mar 21 ✓
High Latitude Underway Connectivity – Status Update (Brief)	**12 Aug 21** ✓ ★
High Latitude Underway Connectivity – Interim Report (Report)	**Oct 23** ★
Limited User Evaluation Complete	Mar 24
High Latitude Underway Connectivity (Report)	**Mar 25** ★

Project Completion: Mar 25

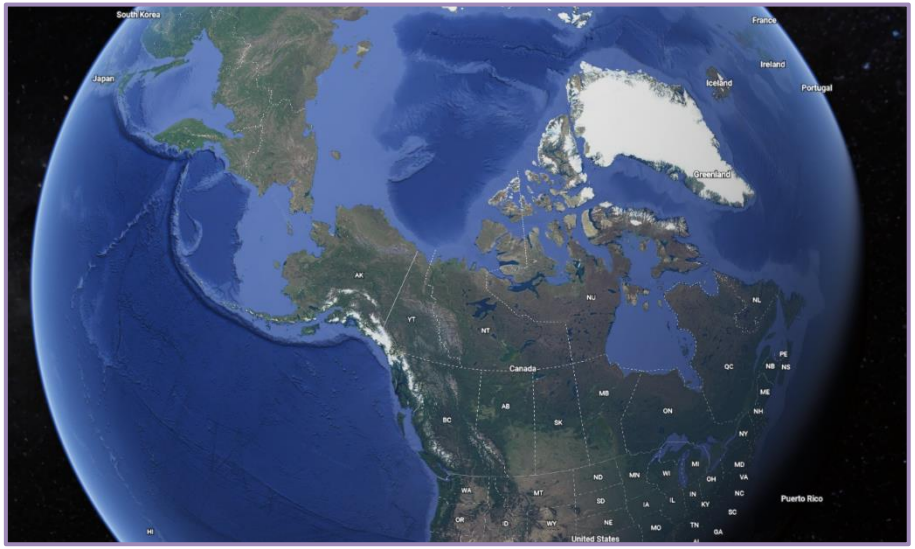
Next Generation Distress Communication Capability for Alaska and the Arctic

1027

Mission Need: Effective and modernized distress communications for Alaska and Arctic.

Objectives

- Evaluate current environmental and geographic challenges of the existing emergency communications system, Rescue 21 (R21) Alaska, in D17.
- Identify potential i911 integration opportunities with commercial Satellite (SAT) phones.
- Support DHS Science and Technology Directorate's (S&T) satellite payload testing for Digital Selective Calling (DSC) relay.
- Perform testing of new Iridium Global Maritime Distress and Safety System (GMDSS) and aid in the integration and training of command centers.



Notes

- Leverage findings from RDC Project 8503 "Radio Frequency (RF) Communications in a Cloud Environment."
- Leverage partnerships within the U.S. Department of Defense (DoD) and U.S. Department of Homeland Security for alternative distress communications methods.
- Identify possible synergies with the DoD Lab Commander Sync and seek to leverage the Ted Stevens Center for Arctic Security Studies.
- Liaise with International Partners to include Canadian Coast Guard/ Defense Research and Development Canada (DRDC).

Sponsor: CG-761	**Stakeholder(s):** CG-68, CG-67, CG-741, CG-SAR, C5ISC, CGCYBER, AFRL, Space Force, DHS S&T
RDC Research Lead: LT Clifford Rosenberg	**CG-926 Domain Lead:** Ms. Holly Wendelin
Anticipated Outcome/ Transition:	Recommendations in Tech Availability & Applicability

Project Timeline / Key Milestones

Project Start: 3 Oct 22		
Initial Cellular-over-Satellite D17 Field Demonstration	Aug 23	
Conclude Cellular-over-Satellite Market Research	Aug 23	
Cellular-over-Satellite Market Research (Brief)	**Sep 23**	★
Arctic Demonstration of Iridium GMDSS on HEALY	Oct 23	
Test and Evaluation Plan for DHS S&T's DSC from Space Prototype	Mar 24	
Distress Comms using Cellular Devices Over SATCOM Links and Iridium GMDSS Test Results (Brief)	**Nov 24**	★
DHS S&T's DSC Testing Leveraging On-orbit Payloads	May 25	
DHS S&T D17 Demonstration of DSC Collection from Space	July 25	
DHS S&T's DSC On-orbit Payload Testing Complete	Nov 25	
Next Generation Distress Communication Capability for Alaska and the Arctic (Report)	**Mar 26**	★
Project Completion: Mar 26		

IT & Networks (ITNET) Branch Support

9998A

Mission Need: Maintain competency/knowledge; provide rapid response; and external liaison.

Objectives

- Build U.S. Coast Guard (CG) Research and Development Center (RDC) competency and technical knowledge/understanding of innovative Information Technology, Networked Systems & Cyber Tools, including: CG mobility, software prototyping, cloud computing, software defined networks, mixed reality, telecommunications, space-based systems, and cyber security systems.
- Evaluate efficient information storage, management and knowledge tech.
- Support ITNET Strategic Project Portfolio Alignment and CG DCO/DCMS Research Priorities; Maintain Branch infrastructure to support RDC Portfolio objectives.
- Provide expert input to CG stakeholders regarding ITNET technologies.
- Establish robust relationships with CG sponsors/stakeholders and external U.S. DoD labs, U.S. Department of Homeland Security (DHS) Science and Technology Directorate (S&T), and other government agency/academic partners.
- Build partnership with CGCYBER – learn about Cyber Protection/Mission Team business and toolkits to position future research support.
- Provide service academy, Historically Black College or University, and Minority Serving Institution students internship opportunities.

Notes

- Develop a "Sector of the Future" (SoF) lab setup to assess how technology can transform Sector-level operation decision-making and communications.
- Command, Control, Communications, Computers, Cyber, Intelligence Service Center (C5ISC) Cutter Lab mockup, computer forensics/cyber test bed.
- Support Cutter Connectivity lab development working in conjunction with C5I Branch as well as collaborate with other DoD Lab projects.
- Participate with C5I organizations such as the Radio Technical Commission for Maritime Services (RTCM) and Institute Navigation.
- Develop TAK skills and matrix support to other branches as capacity allows.

Sponsor: CG-926	**Stakeholder(s):** CG-2, CG-6, CG-7, C5ISC, CGCYBER, DHS S&T
RDC Research Lead: Mr. Rob Riley	**CG-926 Domain Lead:** Ms. Holly Wendelin
Anticipated Outcome/ Transition: Various	

Project Timeline / Key Milestones

Project Start: Ongoing

Field ISR/APP Voting Application	19 Oct 22 ✓
Continue Support of ISR/APP Voting Application	Oct 23
LiFi Testing Build Out (USCGA)	Nov 23
Partner w/ CGCYBER via Temp CPT/CMT Embeds (Develop OV-1 for Testing/Training in RDC SoF Testbed)	Jun 24
Hi-Latitude Communications Equipment Testing (Continue Polar Research Tech Eval Support)	Ongoing

Project Completion: Ongoing

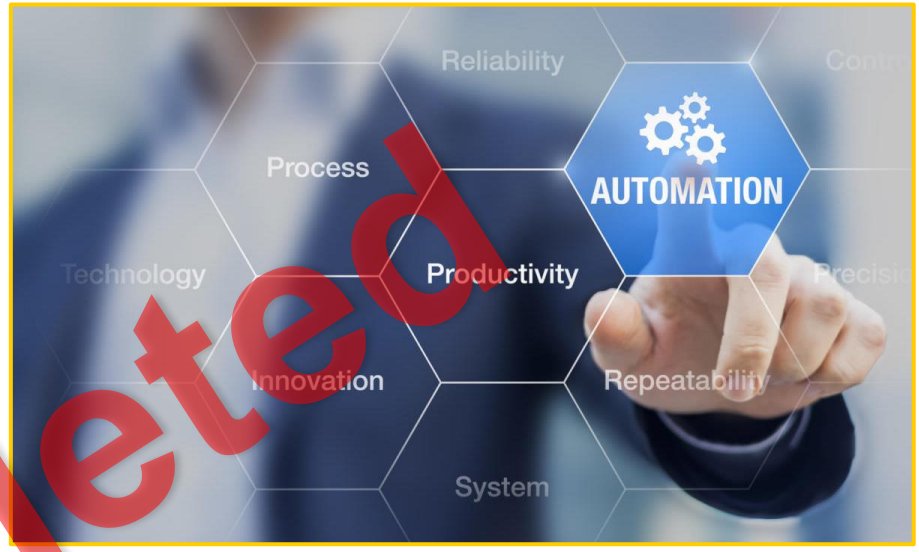
Applications of Robotic Process Automation

7402

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

Objectives

- Provide an understanding of the current state of Robotic Process Automation (RPA).
- Identify challenges to acquiring and implementing RPA solutions.
- Investigate specific use-cases of RPA.
- Identify requirements for sustainment of RPA after development.



Notes

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

Completed

Sponsor: CG-67

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

RDC Research Lead:
Dr. Devon Gunter

CG-926 Domain Lead:
Dr. David Wiesenhahn

Anticipated Outcome/ Transition: Recommendations for Tactics, Techniques & Procedures
Recommendations on Tech Availability & Applicability

Project Timeline / Key Milestones

Project Start: 1 Oct 20	
Identification of RPA Candidate Criteria/Method Completed	20 Jan 21 ✓
FINCEN Effort/Progress Research, Literature Review Completed	29 Jan 21 ✓
Identification of RPA Prototype Use-case Completed	30 Apr 21 ✓
Applications of Robotic Process Automation: Use-case Selection (Brief)	**17 May 21 ✓ ★**
Prototype Development and Evaluation Completed	5 Dec 22 ✓
Applications of Robotic Process Automation (Report)	**6 Feb 23 ✓ ★**
Project Completion: 6 Feb 23	

Incorporating Sensor Performance in SAROPS

7937

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 RDC's previous work with developing SAROPS sensor inputs.

Completed

Sponsor: CG-SAR

Stakeholder(s): LANT/PAC-3, FORCECOM

RDC Research Lead:
Ms. Grace Python

CG-926 Domain Lead:
Dr. David Wiesenhahn

Anticipated Outcome/ Transition: Recommendations for Tactics, Techniques & Procedures
Recommendations for Cost/Risk Avoidance

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	30 Jun 21 ✓
Methods to Develop Sensor-Specific Data Research Complete	24 Jan 22 ✓
Incorporating Sensor Performance in SAROPS (Brief)	**1 Feb 22 ✓ ★**
Process to Predict Sensor Performance for SAROPS Leveraging Physics-Based Models (Brief)	**16 Dec 22 ✓ ★**
Incorporating Sensor Performance in SAROPS (Report)	**27 Apr 23 ✓ ★**
Project Completion: 27 Apr 23	

Verify International Maritime Organization (IMO) Polar Code Survival Time Requirement

1021

Mission Need: Improve long-term polar SAR and Mass Rescue Operations contingency planning.

Objectives

- Use data analysis, and modeling/simulation approaches to investigate the IMO Polar Code survival time; provide recommendations for updates to CG-SAR.
- Estimate expected polar rescue time using past remote rescue operations and changes in polar traffic density.
- Produce a robust data set through mining data sources for remote/polar transits and remote rescue operations for use in mathematical modeling.
- Use the findings to conduct an analysis to evaluate and inform international standards and contingency planning.

Notes

- Conduct a consolidated data analysis of Automatic Identification System (AIS) vessel track information as well as past remote rescue operations.
- Explore partnership opportunities with international organizations including Canadian Search and Rescue (SAR), Finnish Border Guard, IMO, University of Washington Polar Science Center, University of the Arctic Consortium, U.S. Geological Survey historic arctic rescue data, Arctic Council, RAND Corporation, Denmark, & Greenland.
- Leverage past and ongoing RDC efforts relating to polar and SAR operations.

Sponsor: CG-SAR

Stakeholder(s): D17, Center for Arctic Study and Policy, CG-ENG, AREAs

RDC Research Lead:
Ms. Christine Mahoney

CG-926 Domain Lead:
Dr. David Wiesenhahn

Anticipated Outcome/ Transition: Recommendations for Standards/Regulations/Policy

Project Timeline / Key Milestones

Project Start: 1 Oct 21

Research Past Findings from International Efforts Complete	31 Dec 21 ✓
Discover and Access Data Sources Complete	1 Apr 22 ✓
Data Analysis Complete	30 Sep 22 ✓
Verify IMO Polar Code Survival Time Requirement (Brief)	**1 Nov 22 ✓ ★**
Model Development Complete	30 Jun 23 ✓
Verify IMO Polar Code Survival Time Requirement (Report)	**Sep 23 ★**

Project Completion: Sep 23

Persistent Simulation for the CG Workforce

1031

Mission Need: Simulation tool to forecast strategic workforce needs and inform HR policy decisions.

Objectives

- Provide CG-126 (Office of Strategic Workforce Planning and Human Resource Analytics) an efficient approach to make quantitative analysis-based recommendations about Human Resource (HR) policy decisions at a strategic level.
- Explore and/or build a modeling framework and predictive simulation tool that will help analysts examine HR data in a more efficient manner to forecast workforce demands at various points in the future (e.g., 2, 5, 10, or etc. years).
- Develop a framework for a Verification, Validation, and Accreditation approach to address policy/strategy workforce questions for decision-makers and programs.

Notes

- Conduct research to support the Ready Workforce 2030 strategy and Commandant's Intent.
- Agent based simulation modeling is a well-known approach in literature, and promising for this instance.
- Explore collaboration with other partner and military agencies who have addressed this problem space.
- Explore collaboration with the U.S. Department of Homeland Security Science and Technology Directorate Office of University Programs.
- Collaborate with CG Academy faculty on model development.

Sponsor: CG-1B2	**Stakeholder(s):** CG-5, CG-7, CG-12, CG-13, CG Recruiting Command, CG-PSC, CGA, CG-PAE
RDC Research Lead: Mr. Sam Cheung	**CG-926 Domain Lead:** Dr. David Wiesenhahn
Anticipated Outcome/ Transition:	Provide Sponsor/Product Line Tested Prototype Recommendations on Tech Availability & Applicability

Project Timeline / Key Milestones

Project Start: 3 Oct 22	
Investigate Current Research Efforts and Explore Current Commercial/ Government Off The Shelf (COTS/GOTS) Products that May Advance or Support this Effort's Decision Framework and Simulation Modeling Concept	16 Dec 22 ✓
Decide On Whether to Purchase COTS/GOTS, Acquire Contractor Services, and What Resources Are Required	30 Dec 22 ✓
Persistent Simulation for the CG Workforce – Key Decision Point (KDP) (Brief)	**26 Apr 23 ✓ ★**
Develop the Framework and Simulation Model In-line with KDP Outcome	Oct 23
Test the Framework and Model and Analyze Results	Feb 24
Persistent Simulation for the CG Workforce (Report)	**Jul 24 ★**
Project Completion: Jul 24	

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 U.S. Naval Academy (USNA), U.S. Department of Defense Chief Digital and Artificial Intelligence Office (CDAO), U.S. Navy's Naval Air System Command and Naval Sea Systems Command, and U.S. Army Combat Capabilities Development Command Aviation & Missile Center, U.S. Army's Aviation and Missile Research Development and Engineering Center Engineering Directorate Quality Information Systems Branch.

Sponsor: CG-45, CG-41	**Stakeholder(s):** SFLC, ALC
RDC Research Lead: Ms. Christine Hansen	**CG-926 Domain Lead:** Dr. David Wiesenhahn
Anticipated Outcome/ Transition:	Recommendations for Cost/Risk Avoidance Recommendation on Tech Availability and Applicability

Project Timeline / Key Milestones

Project Start: 1 Apr 19	
Initial Surface Asset Review and Benchmarking	1 Dec 19 ✓
CBM for CG Asset Product Lines (Brief)	**14 Feb 20 ✓ ★**
Initial Aviation Asset Review and Benchmarking	1 Oct 20 ✓
CBM for CG Asset Product Lines: Update Brief (Brief)	**7 Oct 21 ✓ ★**
DoD CDAO Predictive Maintenance Representative	1 Jan 22 ✓
CBM for CG Asset Product Lines: Update Brief Two (Brief)	**17 Oct 22 ✓ ★**
DoD H-60 Health and Usage Monitoring System Data Translation Complete	Aug 23
CBM for CG Asset Product Lines: Update Brief Three (Brief)	**Oct 23 ★**
DoD ASET H-60 Sensor Data Analytics	Jun 24
USNA NSC Sensor Data Analysis	Jun 24
CBM for CG Asset Product Lines Summary Report (Report)	**Aug 24 ★**
Project Completion: Aug 24	

Artificial Intelligence/Machine Learning (AI/ML) for Computer Imagery and Sensor Data

1003

Mission Need: Develop, deploy, and sustain artificial intelligence in support of CG missions.

Objectives

To maintain efficiency and improve mission performance, the CG must capitalize on new sensor data sources and technologies such as artificial intelligence and machine learning. To realize the benefits, the CG must:

- Understand the algorithms, software, platform, and service infrastructures available from Department of Homeland Security (DHS), Department of Defense (DoD), National Geospatial-Intelligence Agency (NGA), and other Federal partners for Artificial Intelligence development, deployment, and sustainment.
- Understand the hardware, network, edge, and cloud computing infrastructures in the CG and from Federal partners for AI deployment and operations to support the "edge to watchstander pipeline."
- Examine how imagery and other sensor data can be used in real time to support operators and in post-analysis to support analysts.

Notes

- Track and report on federal partner and commercial AI models and methods in sensor fusion, maritime domain awareness, and pattern of life.
- Track and report on what other DoD, DHS, NGA partners are using and building for their physical and networking AI infrastructure.
- Follow Small Business Innovation Research-Other Agency Technology Solutions, Naval Postgraduate School, U.S. Navy, Joint Artificial Intelligence Center, Air Force Institute of Technology, CT National Guard, National Security Innovation Network, and Intelligence Coordination Center.

Sponsor: CG-2

Stakeholder(s): CG-741, CG-62, CG-MLE, AREAs, Districts, CGCYBER

RDC Research Lead:
Dr. Devon Gunter

CG-926 Domain Lead:
Dr. David Wiesenhahn

Anticipated Outcome/ Transition: Recommendations on Tech Availability & Applicability

Project Timeline / Key Milestones

Project Start: 1 Oct 21

Understand the Current State of CG Edge Sensors	30 Mar 22 ✓
Explore Development Platforms	29 Jul 22 ✓
AI/ML for Computer Imagery and Sensor Data – Progress Update 1 (Brief)	**21 Nov 22 ✓ ★**
Understand State of Edge Sensor Networking	30 Dec 22 ✓
Explore Deployment Platforms	Sep 23
AI/ML for Computer Imagery and Sensor Data – Progress Update 2 (Brief)	**Oct 23 ★**
Understand How Data are Pipelined to AI	Feb 24
Understand and Explore AI to Watchstander Cueing	Apr 24
AI/ML for Computer Imagery and Sensor Data (Report)	**Aug 24 ★**

Project Completion: Aug 24

Cognitive Training for High-Risk Operators

8206

Mission Need: Improve cognitive skills and decision-making in high-risk operations.

Objectives

- Research objective measurements that demonstrate the influence of selected cognitive training program(s) on training environment evaluations.
- Develop a research framework for collecting empirical evidence of performance improvement in the training environment.
- Develop understanding of impact cognitive training programs have on trainees' performance.
- Develop recommendations for one or more cognitive training programs for evaluation in an operational setting.

Notes

- Potential collaboration with CG Auxiliary, Naval Health Research Center in San Diego, Naval Medical Research Unit Dayton, and Naval Special Warfare Command.

Sponsor: CG-721

Stakeholder(s): FORCECOM, MLEA, SMTC, CG-1, MSRT/MSSTs, DoD Spe. Ops, NUSTL, LE/DSF Cmty's

RDC Research Lead:
Dr. Jared Peterson

CG-926 Domain Lead:
Dr. David Wiesenhahn

Anticipated Outcome/ Transition: Recommendations for Tactics, Techniques & Procedures
Recommendation on Tech Availability and Applicability

Project Timeline / Key Milestones

Project Start: 30 Nov 20

Researched Objective Measures	31 Mar 21 ✓
Experimental Design and Cognitive Training Market Research Selection (Brief)	**25 Jan 22 ✓ ★**
Cognitive Training Study Completed	Mar 24
Cognitive Training Influence on Cognitive Skills and Decision-Making (Report)	**Sep 24 ★**

Project Completion: Sep 24

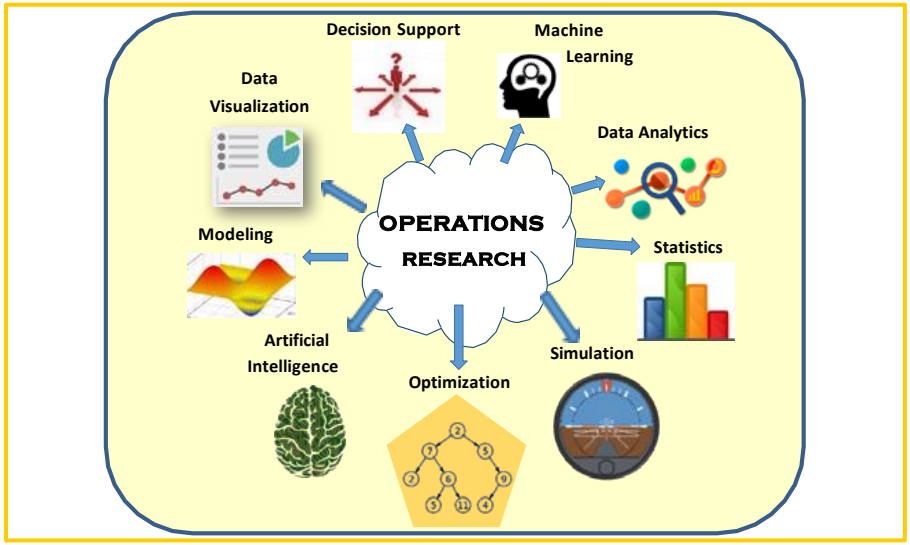
Modeling, Simulation, & Analysis (MSA) Branch Support

9997A

Mission Need: Maintain competency/knowledge; provide rapid response; and external liaison.

Objectives

- Maintain competency and technical knowledge in understanding present and future Operations Research (OR)/Data Analytics (DA) tools and techniques including: modeling & simulation, data analytics, Artificial Intelligence (AI) & Machine Learning (ML), process automation, risk analysis, and human factors.
- Maintain Branch infrastructure to support RDC portfolio objectives.
- Support MSA Strategic Project Portfolio Alignment and CG DCO/DCMS Research Priorities.
- Provide expert input to CG stakeholders regarding use and application of AI/ML and OR/DA technologies and techniques.
- Foster continued relationships with CG sponsors/stakeholders and external Department of Defense labs, Department of Homeland Security (DHS) Science and Technology Directorate (S&T), and other government agency/academic partners.
- Provide service academy, Historically Black Colleges and Universities, and Minority Serving Institutions students internship opportunities.



Notes

- Represent CG on Chief Digital and Artificial Intelligence Office (CDAO) Service Lab AI Research and Development Subcommittee; CDAO Predictive Maintenance Subcommittee; and Tri-Service Lab Commander's Sync Data Analytics Working Group.
- Member of CG-7 Unmanned Systems Integrated Product Team (AI Subcommittee); CG OR/DA Working Group, CG Data Readiness Task Force Advisory Group, CG Modeling & Simulation Advisory Council, and RDC Institutional Review Board.

Project Timeline / Key Milestones

Project Start: Ongoing	
Natural Language Processing Analysis of Unstructured Search and Rescue Narratives (CGA Partnership)	18 May 23 ✓
Great Lakes Ice Breaker Analysis Alternatives	Jul 23
Post-Completion Report Analytics	Aug 23
Boon Logic Report	Sep 23
MORS 2024 (Naval Post-graduate School)	Jun 24
Joint Capability Technology Demonstration: Wide-Area Autonomous Maritime Target Detect and Classifications Technology Demonstration Support	TBD
Project Completion: Ongoing	

Sponsor: CG-926

Stakeholder(s): CG-1/2/6/7/9, CG-5R, CG-5P, DRTF/OD&A, CG-PAE, DCO-X, DHS S&T

RDC Research Lead:
CDR Daniel Sweigart

CG-926 Domain Lead:
Dr. David Wiesenhahn

Anticipated Outcome/ Transition: Various

Drug and Explosives Detection Technologies

5807

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.

Completed

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 Stephen Thomsen
Anticipated Outcome/ Transition:	Recommendations for 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 ✓
Compile Current HID-ETD Progress with SAVER Information to Complete Summary Deliverable	29 Oct 21 ✓
Drug and Explosives Detection Technologies Summary (Report)	**17 Oct 22 ✓ ★**

Project Completion: 17 Oct 22

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.
- Evaluate emerging technologies to enhance CG operations in Polar Regions.

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, Naval Research Laboratory, and the National Science Foundation U.S. Antarctic Program (McMurdo Station).

Sponsor: CG-751	**Stakeholder(s):** CG-5PW, CG-761, PAC-3, LANT-5, D17
RDC Research Lead: Ms. Shalane Regan	**CG-926 Domain Lead:** Ms. Karin Messenger
Anticipated Outcome/ Transition: Recommendations on Tech Availability & Applicability	

Project Timeline / Key Milestones

Project Start: 1 Oct 20

Partners/Technologies/Test Plans Identified (FY21)	30 Jul 21 ✓
FY21 Research Efforts/Partners Solicited	30 Jul 21 ✓
Tests/Demonstrations Complete (FY21)	20 Nov 21 ✓
Partners/Technologies/Test Plans Identified (FY22)	29 Apr 22 ✓
FY22 Research Efforts/Partners Solicited	27 May 22 ✓
Polar Regions Technology Evaluation FY21 (Application Note)	**30 Jun 22 ✓ ★**
Tests/Demonstrations Complete (FY22)	31Oct 22 ✓
Polar Technology Evaluation FY22 (Application Note)	**28 Feb 23 ✓ ★**

Project Completion: 28 Feb 23

Counter Uncrewed Underwater Vehicle (C-UUV) Technology

5922

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

Objectives

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

Notes

- Building on past RDC anti-swimmer work.
- Coordinating with U.S. Naval Undersea Warfare Center - Newport, U.S. Naval Information Warfare Center, and U.S. Indo-Pacific Command.

Completed

Sponsor: CG-721	**Stakeholder(s):** CG-45, CG-731, CG-761, AREA-3, CGCYBER
RDC Research Lead: C-UUV Research Team	**CG-926 Domain Lead:** C-UUV Research Team
Anticipated Outcome/ Transition: Recommendations on Tech Availability & Applicability	

Project Timeline / Key Milestones

Project Start:

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

Project Completion:

Enhanced Rotary Wing Night Vision Goggle (NVG) Searches

1202

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

Objectives

- Deliver decision support information regarding Tactics, Techniques, and Procedures (TTP) opportunities to enhance rotary wing NVG searches for both Search and Rescue (SAR) and Law Enforcement (LE) missions. Research focus will primarily be on augmented lighting sources and their ability to improve existing NVG technologies.
- Investigate mitigation strategies for backlight and ambient light effects for coxswains using NVGs.

Notes

- Explore collaboration opportunities with Air Force Research Laboratory, Naval Research Laboratory, Army Research Laboratory (Adelphi Laboratory Center) and Army Combat Capabilities Development Command C5ISR Center Night Vision and Electronic Sensors Directorate.

Project Timeline / Key Milestones

Project Start: 1 Oct 20	
Commercial/Military Lab NVG & Lighting Advancements Investigated	14 May 21 ✓
Technologies Investigated	23 Jul 21 ✓
Enhanced Rotary Wing Night Vision Goggle (NVG) Searches (Brief)	**9 Sep 21** ✓
Decision Point on Proceeding to RW LUE	8 Dec 21 ✓
Evaluate Coxswain NVG Lighting Mitigation Strategies	16 Jun 23 ✓
Rotary Wing Augmented Lighting and Boat Pilothouse Night Vision Goggle Lighting Interferences (Report)	**Sep 23** ★
Project Completion: Sep 23	

Sponsor: CG-SAR	**Stakeholder(s):** CG-1B3, CG-711, CG-761, CG-41, ALC, ATC, LANT, PAC, FORCECOM, CG-731, C5ISC
RDC Research Lead: Mr. Mike Coleman	**CG-926 Domain Lead:** LT Stephen Thomsen
Anticipated Outcome/ Transition:	Recommendations for Tactics, Techniques & Procedures

Bromine-Free Water Purification System

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 (NSC), Fast Response Cutters (FRC), and Operational Patrol Cutters (OPC).

Notes

- Legislative requirement.
- Collaborating with the U.S. Army Engineer Research and Development Center Construction Engineering Research Laboratory; Naval Surface Warfare Center – Carderock Division, Corona Division, Crane Division, Philadelphia Division; and U.S. Naval Research Laboratory.

Sponsor: Surface Force Logistics Center (SFLC)	**Stakeholder(s):** CG-45, SFLC-LRE
RDC Research Lead: Ms. D. J. Hastings	**CG-926 Domain Lead:** LCDR Stephen Thomsen
Anticipated Outcome/ Transition: Recommendations for Acquisition Milestone Support	

Project Timeline / Key Milestones

Project Start: 27 Jul 19

Bromine-Free Water Purification Partners Identified and Pilot Study Started (Phase 1)	19 Jun 20 ✓
Bromine-Free Water Purification System Pilot Study (Brief) (Phase 1)	**9 Jul 20** ✓ ★
Begin CG Compatibility Review of Bromine-Free Systems on FRC and OPC with NSWC Carderock (Phase 2)	8 Sep 21 ✓
Bromine-Free Water Purification System Summary: Phase I (Report)	**8 Dec 22** ✓ ★
Bromine-Free Systems Integration Feasibility Study (Phase 2)	Sep 23
Bromine-Free Water Purification System Summary: Phase II (Report)	**Dec 23** ★

Project Completion: Dec 23

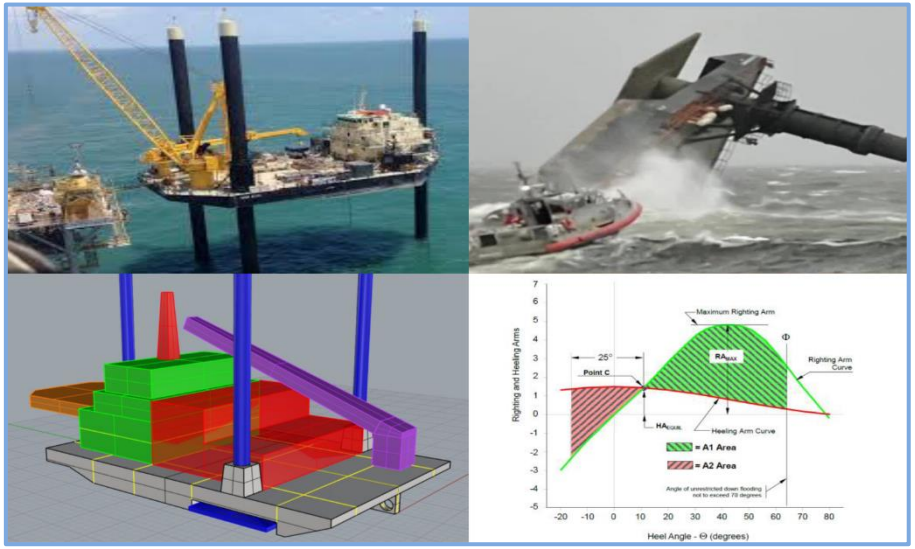
Improve Liftboat Stability Standards

1024

Mission Need: Mitigate stability-related hazards to Liftboats/operators.

Objectives

- Conduct "Non-Ship Shape Vessel Stability Requirements" study.
  - Investigate current CFR, ABS, and CG Liftboat Stability Standards and Regulations.
  - Analyze critical axes of hull design and construction variations through different stability calculation methods.
  - Incorporate Time Domain Simulations to investigate effects of wind and waves on Non-Traditional Hull Forms.
  - Develop mitigation strategies tailored to Liftboat classifications.
- Support classification and regulation revision process as appropriate.



Notes

- Leverage Sponsor activities to conduct "Non-Ship Shape Vessel Stability Requirements" study.
- Leverage current American Bureau of Shipping guidance for building and classing Liftboats.
- Leverage the National Academies of Sciences, Engineering, and Medicine resources.
- Leverage State Maritime Academies.

Sponsor: CG-ENG	**Stakeholder(s):** CG-5P/INV, D8, CG Outer Continental Shelf National COE, CG Marine Safety Center
RDC Research Lead: LT Dean Gilbert	**CG-926 Domain Lead:** LT Stephen Thomsen
Anticipated Outcome/ Transition: Recommendations for Standards/Regulations/Policy	

Project Timeline / Key Milestones

Project Start: 1 Oct 21

Liftboat Observation at D8	11 Mar 22 ✓
Liftboat Stability Standards Recommendations (Brief)	**Jul 23** ★
Stability Analysis and Testing Complete	Aug 23
Developed/Revised Liftboat Regulation Changes	Dec 23
Liftboat Stability Standards Classifications and Recommendations (Report & Brief)	**Feb 24** ★

Project Completion: Feb 24

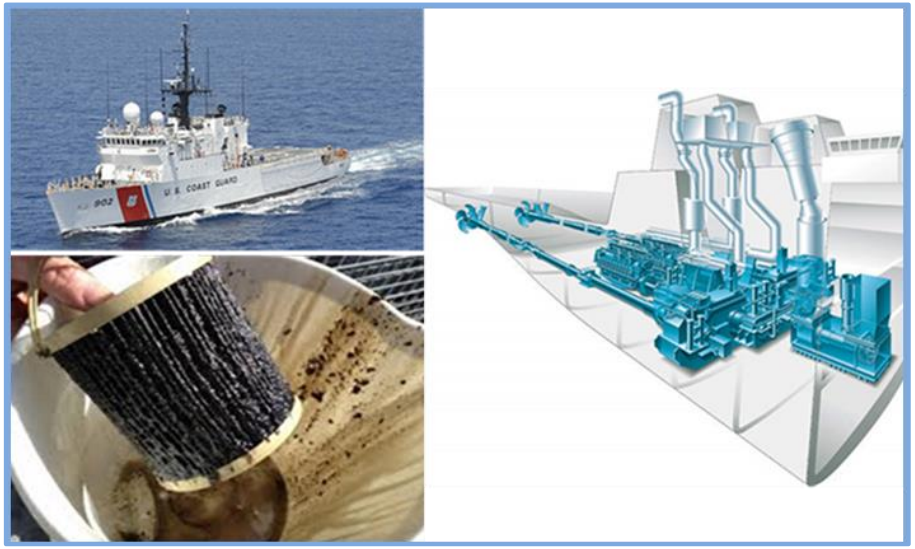
Engine Combustion Enhancement Technology

1002

Mission Need: Enhance combustion efficiency to improve engine performance and reduce pollution.

Objectives

- Query the U.S. Navy (USN) and other organizations to leverage possible solutions for enhancing combustion efficiency in diesel fuel for energy/propulsion.
- Identify quantitative parameters for testing the efficacy of using new fuel additives, and combustion enhancement products.
- Perform field evaluations of available commercial technology with the goal of countering incomplete combustion to improve fuel efficiency, reducing pollution, and reduce maintenance costs.
- Assess cost and benefits for technology based on test results.
- Report results on product performance and provide recommendations.
- Evaluate technologies on engines representative of U.S. Coast Guard (CG) assets.



Notes

- Partner with Naval Surface Warfare Center Philadelphia Division on ongoing combustion efficiency research.
- Leverage CG Academy research on biocide additives.
- Technologies could also be applicable to gasoline and aviation fuel.
- This project ties into Project Evergreen climate change event.

Sponsor: CG-46	**Stakeholder(s):** CG-45, Surface Forces Logistics Center, CGA, CG-47D
RDC Research Lead: Mr. Derek Meier	**CG-926 Domain Lead:** LT Stephen Thomsen
Anticipated Outcome/ Transition:	Provide Sponsor/Product Line Tested Prototype Recommendations for Product Line Tech Insertion

Project Timeline / Key Milestones

Project Start: 1 Oct 21

Engine Combustion Enhancement Technology: Down Selection (Brief)	**9 Feb 23** ✓ ★
Initiate Biocide Laboratory Testing	19 Jun 23 ✓
Initiate Engine Prototype Testing	Jul 23
Engine Combustion Enhancement Technology (Report)	**Mar 24** ★

Project Completion: Mar 24

Cutter-Based Uncrewed Systems (UxS) Integration Analysis

1028

Mission Need: Integrated UxS across cutter fleet to augment operational capabilities.

Objectives

- Determine the capacity for FRC/WLM/WLB cutter classes to integrate, deploy, and support UxS.
- Identify applicable UxS classes, based on space, weight, power, capability, and personnel requirements for specified afloat platforms.
- Strategize and assess possible cutter/UxS combinations and integration considerations through facilitated stakeholder workshops.
- Identify design efficiencies related to human, mission, system and infrastructure integration.
- Deliver decision support information regarding UxS integration by performing and documenting results of Operational Demonstration (OP DEMO).
- Inform future capability and operational documents.

Notes

- UxS integration considers maritime air, surface, and subsurface systems of all scales that can be based onboard a cutter.
- Leverages RDC Project 7820 “Maritime Uncrewed System Technology” to highlight capabilities.
- Addresses imperatives highlighted by National Academies of Science UxS study.
- Leverage research by the Naval Post Graduate School, Navy Surface Warfare Centers, and Naval Research Laboratory.

Sponsor: CG-751

Stakeholder(s): CG-7 UxS, CG-731, CG-711, CG-721, CG-771, CG-4, CG-2, CG-93, CG-1B3, D7 (dre)

RDC Research Lead:
LT Dean Gilbert

CG-926 Domain Lead:
Mr. Scott Craig

Anticipated Outcome/ Transition: Recommendations for Product Line Tech Insertion
Recommendations on Tech Availability & Applicability

Project Timeline / Key Milestones

Project Start: 3 Oct 22

Cutter Capacities and UxS Characterization Crosswalk	Sep 23
Interactive Visualizer Prototype	Dec 23
Mission Integration Workshops	Jan 24
Cutter-based UxS Integration (Brief)	**Mar 24** ★
D7 OP DEMO Site Visit / Command Briefing	Apr 24
D7 OP DEMO	May 24
Cutter-based UxS Integration (Report)	**Sep 24** ★

Project Completion: Sep 24

Remote Diagnostic and Monitoring Systems for Technical Support Engineering

1030

Mission Need: Improve shore-side access to cutter engineering data.

Objectives

- Assess Supervisory Control and Data Acquisition (SCADA) implementation across CG cutter classes.
- Investigate Military/Other Government Agency (OGA)/Commercial vessel SCADA data transfer technology maturity & implementation framework.
- Creation of SCADA Working Group to develop use cases and roadmap SCADA solutions.
- Develop a demonstration plan for a data transfer system on a selected CG asset.
- Perform demonstration of selected SCADA technologies.
- Deliver decision support information and technology transition report and use case roadmaps.

Notes

- Leverage Naval Sea Systems Command and Military Sealift Command for technology framework application.
- Partner with Surface Forces Logistics Center (SFLC) and RDC Project 9204 "Condition Based Maintenance for Coast Guard Asset Product Lines" Project Manager for solution integration with CG systems (e.g., CG-LIMS, ALMIS, etc.).
- Collaboration with Naval Surface Warfare Center for SCADA prototype and demonstration.
- Potential collaboration with the Naval Postgraduate School and Johns Hopkins Applied Physics Laboratory.

Sponsor: SFLC	**Stakeholder(s):** CG-761, CG-751, CG-45, CGCYBER, CG-ODA
RDC Research Lead: Mr. Matthew Lees	**CG-926 Domain Lead:** LT Stephen Thomsen
Anticipated Outcome/ Transition:	Recommendations for Product Line Tech Insertion Provide Sponsor/Product Line Tested Prototype

Project Timeline / Key Milestones

Project Start: 3 Oct 22

Cutter Surveys and SCADA Assessment	31 May 23 ✓
Military/OGA/Commercial SCADA Data Transfer Technology Benchmarking	30 Jun 23 ✓
Supervisory Control and Data Acquisition Data Transfer Technology Investigation (Brief)	**Sep 23** ★
Drafting of SCADA Working Group Charter	Sep 23
SCADA Prototype Demonstration	Sep 24
SCADA Demonstration Evaluation Complete	Feb 25
Remote Diagnostics and Monitoring Systems for Technical Support Engineering (Report)	**Jun 25** ★

Project Completion: Jun 25

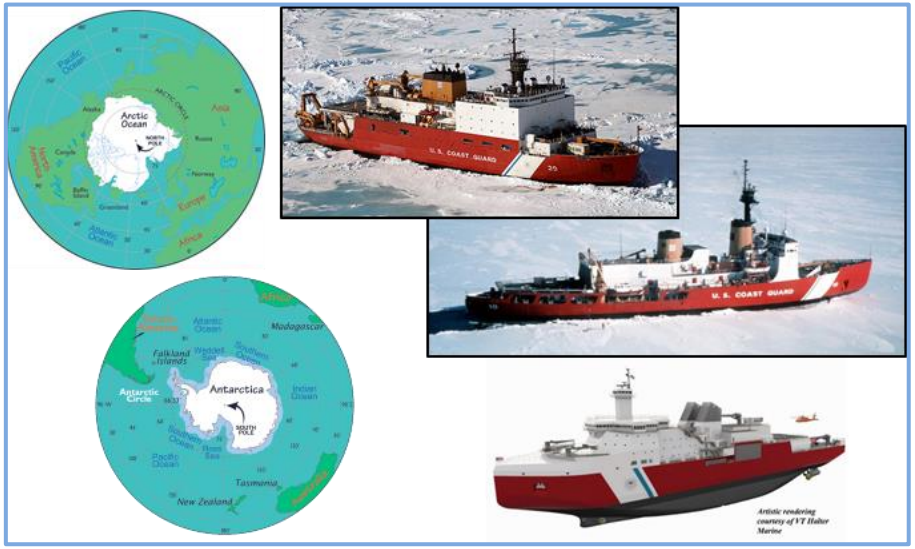
Polar Regions Technology Evaluation 2023-2025

1026

Mission Need: Innovative capability solutions for enhanced operations in the Polar Regions.

Objectives

- Provide support to projects which develop capability improvements in the execution of CG missions in Polar Regions.
- Cultivate joint efforts and interagency cooperation between government sectors and civilian entities.
- Evaluate emerging technologies to enhance CG operations in Polar Regions.



Notes

- Anticipate partnerships with the U.S. Department of Defense Labs, U.S. Northern Command, National Labs, Office of Naval Research Science, International Cooperative Engagement Program for Polar Research and the National Science Foundation U.S. Antarctic Program (McMurdo Station).

Sponsor: CG-751

Stakeholder(s): CG-5PW, CG-761, PAC-3, LANT-5, D17

RDC Research Lead:
Ms. Shalane Regan

CG-926 Domain Lead:
Ms. Karin Messenger

Anticipated Outcome/ Transition: Recommendations on Tech Availability & Applicability

Project Timeline / Key Milestones

Project Start: 3 Oct 22	
Polar Regions Technology Evaluation (PRTE) – FY23 Planning Summary (Brief)	**31 Jan 23** ✓ ★
Operation Deep Freeze (ODF) 23 Tests/Demos Complete	10 Apr 23 ✓
HEALY 2023 Tests/Demos Complete	Nov 23
PRTE – FY24 Planning Summary (Brief)	**Feb 24** ★
ODF 24 Tests/Demos Complete	Apr 24
FY23 PRTE (Technical Note)	**Jul 24** ★
HEALY 2024 Tests/Demos Complete	Nov 24
PRTE – FY25 Planning Summary (Brief)	**Jan 25** ★
ODF 25 Tests/Demos Complete	Apr 25
FY24 PRTE (Technical Note)	**Jun 25** ★
Polar Regions Technology Evaluation Exercise	Sep 25
HEALY 2025 Tests/Demos Complete	Nov 25
FY25 PRTE (Technical Note)	**Jun 26** ★
Project Completion: Jun 26	

Surface Branch Support

9994A

Mission Need: Maintain competency/knowledge; provide rapid response; and external liaison.

Objectives

- Maintain U.S. Coast Guard (CG) Research and Development Center (RDC) competency and technical knowledge in understanding present and future surface asset technology and systems including: unmanned surface & sub-surface systems; boarding team tools; compel compliance; law enforcement; Chemical, Biological, Radiological, Nuclear, and Explosives countermeasures; alternative energy; and polar region capabilities.
- Maintain Branch infrastructure to support RDC portfolio objectives.
- Support Surface Strategic Project Portfolio Alignment and CG DCO/DCMS Research Priorities.
- Provide expert input to CG stakeholders regarding surface technologies.
- Foster continued relationships with CG sponsors/stakeholders and external U.S. Department of Defense labs, U.S. Department of Homeland Security (DHS) Science & Technology Directorate (S&T) and other government agency/academic partners.
- Provide service academy, Historically Black College or University, and Minority Serving Institution students internship opportunities.

Notes

- Explore unmanned surface vessel collision avoidance autonomy.
- RDC Arctic/Polar Coordinator and Representative to U.S. Arctic Research Commission.

Project Timeline / Key Milestones

Project Start: Ongoing

Uncrewed Surface Vessel (USV) Maritime Domain Awareness Sensor Integration	28 Feb 23 ✓
USV Connectivity Evaluation	16 Mar 23 ✓
Uncrewed Aerial System/USV Collaborative Tasking	Jul 23
Cutter-based USV Concept of Operations Development	Sep 23
Joint Capability Technology Demonstration Wide-Area Autonomous Maritime Target Detect and Classification Technology Demonstration Support	TBD

Project Completion: Ongoing

Sponsor: CG-926	**Stakeholder(s):** CG-43, CG-45, CG-5PW, CG-721, CG-731, CG-751, CG-7 UxS, CG-932, SFLC, DHS S&T
RDC Research Lead: Mr. Evan Gross	**CG-926 Domain Lead:** LT Stephen Thomsen
Anticipated Outcome/ Transition: Various	

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
Vessel Monitoring with RFID	*Use Radio Frequency Identification (RFID) technology to assist with vessel movements, tracking, and access control.* *Result: RFID technology is not ready for use in this type of "small, dark" application. Any RFID technology with enough range requires an active transmitter onboard the vessel, which therefore requires a willing partner.*	N/A	N/A
After Action Report Modernization	*Potential solution to automated report extraction.* *Result: Due to the constraints of the current database and its graphical user interface, manual downloading/uploading of individual AARs will still be required if a third party AI/ML-capable software is introduced. As such, improvements to the efficiency of the analysis process will be marginal. Accessing and linking the database to a potential software solution is beyond the scope of the STIC.*	N/A	N/A
ALC Software Storage System	*Special use IT for temporarily storing hard drives while software is refreshed.* *Result: Task is cancelled due to non-availability of the required hardware.*	N/A	N/A
Wearable Sensors	*Evaluate wearable sensors for use by CG personnel operating in high stress environments.*	MSRT	17 Nov 22 ✓
Remotely Operated Brush Cutter	*Improve Aids to Navigation mission execution and reduce injuries and crew downtime from poison ivy and snake bites.*	D-8	4 Apr 23 ✓
Heated Diving Vests	*Determine the state of the market for heated waterproof vests and characterize their efficacy in keeping members warm.*	National Ice Rescue School	4 Apr 23 ✓

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

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

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
Additive Manufacturing Materials Testing	*Survey current trends in additive manufacturing materials and work to determine how the technology can be used in the Coast Guard's Industrial enterprise.*	IPF NOLA	18 Apr 23 ✓
Trillium HD80 EO/IR Sensor	*Evaluate sensors to support data generation and imagining for Law Enforcement and Search and Rescue missions.*	CG-711	18 Apr 23 ✓
Boat Crew Communications System Improvement	*Improved Boat Crew Communications System for more effective communications.*	SFLC-SBPL, C5ISC	9 Jun 23 ✓
Coastal Monitoring Technology Evaluation	*Test and demonstrate various coastal monitoring technologies for use in the D-8 AOR.*	D-8	Jul-23
Noise Attenuation	*Determine the tradeoffs and effectiveness of using engineering controls to reduce the noise levels that operational crews are exposed to.*	SFLC-PBPL	Jul-23
Marking of Adrift/Abandoned Vessels	*Evaluate unambiguous marking to avoid duplicate launches on same vessel.*	D-13 SAR	Jul-23
Safety of Burning Vessels at Sea	*Investigate inherently safe options for at sea burning.*	CG-721	Jul-23

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

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
Electric Outboard	*Test electric outboards for use on small skiffs and for operations in areas lacking pier infrastructure.*	USCGC STRATTON, CG-731	Jul-23
Space Accountability	*Investigate the use of various technologies for various missions including (but not limited to): boarding team space accountability; and Civil Engineering Unit (CEU) damage assessment.*	CG-721, CEUs, CG-4	Aug-23
Bounce Imaging Systems	*Investigate throwable cameras for use in various LE operations.*	MSRT-E	Aug-23
LIDAR for Everything	*Examine a range of LIDAR sensors, software and systems to determine what the various capabilities and potential applications for this technology are in the Coast Guard.*	SFLC-IOD, TACLET South	Sep-23
Starlink Maritime	*Determine the availability of the Starlink "Maritime" system and to use that system to facilitate various operational tests including (but not limited to): High Latitude Comms; MDA*	C5ISC	Sep-23
Wave Characterization for CEUs	*Examine advances in low-cost buoy systems and sensors for use by CEUs to monitor pier infrastructure.*	CEU Providence, STA New London	Sep-23
Thermal Imaging and NVG Integration	*Examine the state of the market for using thermal imaging systems to enhance night vision goggles.*	STA Ketchikan	Sep-23

Science & Technology Innovation Center (STIC) Branch Support

9995A

Mission Need: Increase unity, share knowledge, build innovation culture, and transition technology.

Objectives

- Maintain U.S. Coast Guard (CG) Research and Development Center (RDC) competency and technical knowledge in understanding present and future technology to support CG mission execution.
- Maintain a collaborative relationship between the CG's Research, Development, Test and Evaluation Program Office and the U.S. Department of Homeland Security (DHS) Science & Technology Directorate (S&T) along with Department of Defense, Department of Energy, and the Federal Laboratory Consortium to share and advance technologies that will be mutually beneficial to both parties.
- Provide Tactics, Techniques and Procedures for use in development of requirements for new technology evaluations and transitions.
- Maintain Branch infrastructure to support RDC portfolio objectives.
- Support Strategic Project Portfolio and CG DCO/DCMS Research Priorities.
- Provide expert input to CG stakeholders regarding advanced technologies.
- Provide service academy, Historically Black College or University, and Minority Serving Institution students internship opportunities.

Notes

- Align with DHS S&T Integrated Project Team gaps and CG Idea Submission Review input.
- Support RDC tasks as requested.

Sponsor: CG-926	**Stakeholder(s):** DHS S&T, Various
RDC Research Lead: Mr. Scott Fields	**CG-926 Domain Lead:** Ms. Minh-Thu Phan
Anticipated Outcome/ Transition:	Various Provide Sponsor/Product Line Tested Prototype

Project Timeline / Key Milestones

Project Start: Ongoing

Waterways Commerce Cutter Sonar Evaluation (RRT Note)	**28 Apr 23** ✓ ★
ISR Buoy for MDA	Sep 23
FY23 Support	Sep 23
Joint Capability Technology Demonstration Wide-Area Autonomous Maritime Target Detect and Classification Technology Demonstration Support	TBD

Project Completion: Ongoing

RDC Evergreen Pinecone in Collaboration with DCO-X

Mission Need: Understand strategic Research and Development science based issues.

Objectives

- Evergreen was meant not only to develop long-range plans or strategies, but also to instill strategic intent throughout the Coast Guard. Strategic intent is a shared organizational understanding of where the Service as a whole is going and why.
- Each Evergreen Pinecone frames future CG strategies, operational approaches, and research areas to address impact concerns specific to the topic over the next 10-50 years. The event output will help the Service formulate adaptation, mitigation, resilience strategies and focus R&D initiatives for the coming decades.
- RDC supports Pinecone events as Science Advisors to the Service.

Notes

- DCO-X & RDC will collaborate and conduct at least one strategic foresight exercise each year. Each event will involve:
  - Identifying a mutual area of strategic research or emerging technology.
  - Convene leadings Subject Matter Experts to discuss focused questions.
  - Produce a Quick Look and Final Report for Senior service decision makers.

Sponsor: DCO-X

Stakeholder(s): LANTAREA/PACAREA

RDC Research Lead:
Dr. Joe DiRenzo

Anticipated Outcome/ Transition: Recommendations on Tech Availability & Applicability
Recommendations for Tactics, Techniques & Procedures

Project Timeline / Key Milestones

Project Start: Ongoing		
Space Evergreen Pinecone	23 Sep 21 ✓	
Space Evergreen Quick Look	8 Oct 21 ✓	
Space Evergreen (Report)	**28 Oct 21** ✓	★
Climate Evergreen Pinecone	31 Aug 22 ✓	
Climate Evergreen Quick Look	7 Oct 22 ✓	
Climate Evergreen (Report)	**20 Dec 22** ✓	★
Autonomous Systems Evergreen Pinecone	Sep 23	
Autonomous Systems Evergreen Quick Look	Oct 23	
Autonomous Systems Evergreen (Report)	**Jan 24**	★
Project Completion: Ongoing		