# Table of Contents | FY21 RDT&E Project Portfolio

<table>
<thead>
<tr>
<th>Branch Area</th>
<th>Project #</th>
<th>Project</th>
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<td>Incorporating Sensor Performance in SAROPS</td>
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<td>7815 (2021-02)</td>
<td>Advanced Maritime Counter-Unmanned Aircraft System (C-UAS) Technologies</td>
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<td>7691</td>
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<td>Cybersecurity Vulnerabilities, Threats, and Risk Mitigation Strategies for Coast Guard Surface and Air Assets</td>
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<td>8504 (2021-04)</td>
<td>Mission-Specific Long-Range Communication Analysis</td>
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<td>Freshwater In-Situ Oil Burn Research</td>
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<td>Advancing UAS and AUV Capabilities to Characterize Water Column and Surface Oil in Ice Environments</td>
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<td>4204 (2021-20)</td>
<td>Behavior of Diluted Bitumen (Dilbit) in Fresh Water</td>
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<td>Survival Modeling, Reporting, and Statistics</td>
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<td>Next Generation Aids to Navigation Buoys &amp; Alternative Moorings</td>
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</table>
### Table of Contents | FY21 RDT&E Project Portfolio

<table>
<thead>
<tr>
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<th>Project</th>
<th>Status</th>
<th>Slide #</th>
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<td>Automatic Identification System (AIS) Cyber Security</td>
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<td>Research into Navigational Safety Risk Modeling and Analysis Tool</td>
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<td>Machine Learning Platforms to Improve Coast Guard Tools</td>
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<td>Condition-Based Maintenance (CBM) for Coast Guard Asset Product Lines</td>
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<td>Applications of Robotic Process Automation</td>
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<td>Cognitive Training for High Risk Operators <em>(New)</em></td>
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<td>Counter Unmanned Underwater Vehicle (C-UUV)/Anti-Swimmer Technology</td>
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<td>Drug and Explosives Detection Technologies</td>
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<td>Cold Spray Restoration of Vessel and Aircraft Components</td>
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<td>Enhanced Rotary Wing Night Vision Goggle (NVG) Searches</td>
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<td>Polar Regions Technology Evaluation 2021 - 2022</td>
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<td>FY21-22 Surface Branch Support</td>
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<td>STIC (Science &amp; Technology Innovation Center)</td>
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<td>Science &amp; Technology Innovation Center (CG-STIC) Tasks (<em>U.S. Department of Homeland Security Science and Technology Directorate funding</em>)</td>
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<td>FY21-22 Science &amp; Technology Innovation Center (STIC) Branch Support</td>
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Airborne Counter Unmanned Aircraft Systems (C-UAS)

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

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

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

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

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

**Anticipated Transition:** Knowledge Product
**Future Technology**

### Project Timeline / Key Milestones

| Project Start: | Please e-mail [RDC-Info@uscg.mil](mailto:RDC-Info@uscg.mil) for information concerning the Milestones and Deliverable Schedule. |
| Project Completion: | |

**Indicates RDC Product ★**

April 2021 5
Autonomous Surface-Search Sensor for Manned Aircraft

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

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

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

**Project Timeline / Key Milestones**
- **Project Start:** 1 Oct 19
- **Autonomous Sensor Technology Update:** 18 May 20
- **Autonomous Surface-search Sensor Performance Data Update:** 16 Jun 20
- **Integration Hardware/Software Engineering Complete:** 19 Aug 20
- **Mission Performance Modeling Complete:** 19 Aug 20
- **Autonomous Surface Search Sensor for CG Rotary Wing Assets (Brief):** 12 Jan 21

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

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

**Anticipated Transition:** Knowledge Product
*Future Technology*

Indicates RDC Product ★
April 2021 6
Incorporating Sensor Performance in SAROPS

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

Objectives

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

Notes

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

Sponsor: CG-SAR

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

RDC Research Lead: Ms. Grace Python

CG-926 Domain Lead: Mr. Scott Craig

Anticipated Transition: Knowledge Product

Influence Tactics, Techniques, & Procedures

Project Timeline / Key Milestones

- Project Start: 2 Oct 17
- Completion of Work Under Original Project Scope 13 Mar 19
- Project Re-scoped and Retitled 11 Jul 19
- Required SAROPS Input to Develop Sweep Width (Brief) 15 Dec 19
- Key Decision Point 16 Dec 19
- Sensitivity Analysis & Underlying Assumption Investigation Complete Jun 21
- SAROPS Sensitivity Analysis (Brief) Jun 21
- Methods to Develop Sensor-Specific Data Research Complete Aug 21
- Incorporating Sensor Performance in SAROPS (Prototype) Aug 21
- Incorporating Sensor Performance in SAROPS (Report) Apr 22
- Project Completion: Apr 22
## Mission Need:
Operationally effective C-UAS force protection capability.

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

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

### Sponsor:
CG-MSR

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

### RDC Research Lead:
C-UAS Research Team

### CG-926 Domain Lead:
C-UAS Research Team

### Anticipated Transition:
Product
*Fielded Prototype*

### Project Timeline / Key Milestones
Please e-mail [RDC-Info@uscg.mil](mailto:RDC-Info@uscg.mil) for information concerning the Milestones and Deliverable Schedule.

### Project Completion:

---

*Indicates RDC Product ⭐*
Beyond Visual Line of Sight (BVLOS) Technology for Coast Guard (CG) Unmanned Aircraft System (UAS) Operations

Mission Need: BVLOS operations for CG UAS.

Objectives

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

Notes

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

Sponsor: CG-711
Stakeholder(s): CG-751, CG-931, SOUTHCOM, JIATF-S, NRL
RDC Research Lead: Mr. Stephen Dunn
CG-926 Domain Lead: Mr. Scott Craig

Anticipated Transition: Knowledge Product

Acquisition Milestone Support

Project Timeline / Key Milestones

- Project Start: 13 Mar 19
- Establish Evaluation Team for DAA Technologies: 28 Oct 19 ✓
- Submit RFI for BVLOS Technologies: 15 Jan 20 ✓
- Coordinate VTOL Demonstrations from a CGC: 15 Aug 20 ✓
- VTOL Operations from a CGC (Brief): 9 Nov 20 ✓ ★
- BVLOS Technologies Integrated into sUAS Complete: Apr 22
- Detect and Avoid Technologies Integration (Brief): May 22 ★
- Land Based BVLOS Tech Demo with sUAS Complete: Jul 22
- Vessel Based BVLOS Tech Demo with sUAS Complete: Jan 23
- Land and Vessel Based BVLOS Demonstrations (Brief): Mar 23 ★
- BVLOS Technology VTOL UAS Integration Complete: Aug 23
- BVLOS VTOL SAR Limited User Evaluation Complete: Nov 23

Project Completion: Mar 24

Indicates RDC Product ★
April 2021 9
**FY21-22 Aviation Branch Support**

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

**Objectives**
- Maintain RDC competency and technical knowledge in understanding present and future aviation and test & evaluation technology/systems including: manned and unmanned aircraft systems, mission analysis, wide area surveillance, search & rescue, and persistent/strategic Maritime Domain Awareness.
- Maintain Branch infrastructure to support 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 DoD labs, DHS S&T, and other government agency/academic partners.
- Provide CG Academy cadets and other academic institution students with internship opportunities.

**Notes**
- Lead for Bear Trap enhanced Maritime Domain Awareness effort with District 11.
- Nexus for R&D Unmanned efforts.
- Participating in CG Unmanned Systems Integrated Product Team (IPT).
- Participating in Medium Range UAS IPT and Small UAS Work Group.
- Partnered with Air Force Research Laboratory Agility Prime Electric Vertical Takeoff And Landing aircraft work.

**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 Transition:** Various

**Project Timeline / Key Milestones**
- **Project Start:** Ongoing
  - **CG District 11 MDA “Bear Trap” Support**  
    - **CG District 11 MDA “Bear Trap” Support** (Apr 21)
  - **Primus 700 Market Research (Brief)** (Aug 21, ⭐)
- **Project Completion:** Ongoing

**Indicates RDC Product:** ⭐

April 2021
# Redefine Field Intelligence Reporting and Analysis

**Mission Need:** Improved information dominance in the maritime domain.

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<th>Objectives</th>
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<td>▪ Automate analysis of field intelligence reports by leveraging cutting edge human language tools, artificial intelligence, machine learning and other analytical tools.</td>
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<td>▪ Enable shorter feedback loops with relevant, timely, and predictive intelligence for CG decision makers by utilizing government cloud technology.</td>
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<th>LT Anne Newton</th>
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<td>CG-926 Domain Lead:</td>
<td>Ms. Holly Wendelin</td>
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## Project Timeline / Key Milestones

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<td>5 Mar 20 ✓</td>
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<tr>
<td>Research Functional Characteristics and Processes</td>
<td>27 Mar 20 ✓</td>
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<tr>
<td>Complete Prototype</td>
<td>31 May 20 ✓</td>
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<td>Limited User Evaluation Complete</td>
<td>30 Sep 20 ✓</td>
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<td>Redefine Field Intelligence Reporting and Analysis (Report)</td>
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**Project Completion:** 25 Feb 21

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*Indicates RDC Product*
Maritime Counter Unmanned Aircraft Systems (C-UAS)

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

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

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

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

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

Anticipated Transition: Product
Fielded Prototype

Project Timeline / Key Milestones

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

Project Start:

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

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

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

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

### Sponsor
**Sponsor:** CG-791

### Stakeholder(s)
**Stakeholder(s):** CG-761, CG-711, CG-751, CG-933, CSISC, CYBERCOM

### RDC Research Lead
**RDC Research Lead:** Mr. Robert Taylor

### Ms. Holly Wendelin

### Anticipated Transition
**Anticipated Transition:** Knowledge Product

*Influence Tactics, Techniques, & Procedures*

### Project Timeline / Key Milestones

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<td>Inventory of Surface Systems for Evaluation Complete</td>
<td>26 Oct 17 ✓</td>
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<tr>
<td>GPS/AIS Cyber Assessment (Report)</td>
<td>22 Feb 18 ✓ ★</td>
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<td>Surface Asset Assessment Complete</td>
<td>5 Apr 18 ✓</td>
</tr>
<tr>
<td>Cyber Risk Mitigation Systems Research Complete</td>
<td>31 Oct 18 ✓</td>
</tr>
<tr>
<td>CG Surface Asset for Cyber Risk Mitigation Selected</td>
<td>18 Dec 19 ✓</td>
</tr>
<tr>
<td>Cyber Risk Mitigation Strategy in Lab Environment Complete</td>
<td>29 Jun 20 ✓</td>
</tr>
<tr>
<td>Cyber Risk Mitigation Demonstration on CGC Complete</td>
<td>2 Sep 20 ✓</td>
</tr>
<tr>
<td>Cybersecurity for Coast Guard Surface and Air Assets (Report &amp; Brief)</td>
<td>Jul 21 ★</td>
</tr>
</tbody>
</table>

**Project Start:** 3 Oct 16

**Project Completion:** Jul 21

Indicates RDC Product ★
Modernizing Law Enforcement Encounter Background Checks at Sea

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

- Improve the current process for Law Enforcement personnel to enable faster and more accurate results delivered on-scene directly to the Boarding Officer by building and deploying a prototype in the field to be evaluated by Boarding Officers and Intelligence Coordination Center (ICC) Coastwatch experts.
- Create new targeting rule sets in partnership with ICC Coastwatch to enable automation of substantive results in near real time.
- As CGHQ program offices build the new mobile MISLE called ENFORCE, ensure that all project efforts for modernization are in-line and compatible with ENFORCE.
- This goal of this effort is that this modernized process will be a “plug-in” for 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 Connecticut State Police to explore technologies being used.

**Project Timeline / Key Milestones**

<table>
<thead>
<tr>
<th>Event</th>
<th>Start Date</th>
<th>End Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market Research Complete</td>
<td></td>
<td>May 21</td>
</tr>
<tr>
<td>Modernizing Law Enforcement Encounter Background Checks at Sea (Brief)</td>
<td>Jun 21</td>
<td></td>
</tr>
<tr>
<td>New ICC Targeting Automation Framework</td>
<td>Sep 21</td>
<td></td>
</tr>
<tr>
<td>Selected ID Checking Plug-in Technology</td>
<td>Oct 21</td>
<td></td>
</tr>
<tr>
<td>Develop Prototype Background Check Plug-in</td>
<td>Dec 21</td>
<td></td>
</tr>
<tr>
<td>Prototype Testing Completed</td>
<td>Feb 22</td>
<td></td>
</tr>
<tr>
<td>Modernizing Law Enforcement Encounter Background Checks at Sea (Report)</td>
<td>May 22</td>
<td></td>
</tr>
<tr>
<td>Project Completion</td>
<td></td>
<td>May 22</td>
</tr>
</tbody>
</table>

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

**RDC Research Lead:** Ms. Lauren Eberly  
**CG-926 Domain Lead:** Ms. Holly Wendelin

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

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

Objectives
- Determine an optimized list of long range communications options for each CG mission in each area of operation, met with available or near term available equipment. This will be accomplished by:
  - Identifying baseline, new, and emerging long-range communications options to include technologies such as:
    - Low, medium, and High Frequency (HF).
    - Satellite communications.
    - 3G/4G/5G automatic link establishment.
  - Developing a comprehensive matrix assessing those technologies for applicability by mission or geographic area including technical performance and resource burden.
  - Conducting testing or demonstration of the most relevant technologies and assess value added compared to baseline capability.
- Leverage CG-761-developed Capabilities Based Assessment on current state of U.S. Coast Guard long-range communications.
- Partner with Naval Postgraduate School on a proposed thesis analyzing (1) Digital Radio Mondiale as an HF communications capability with encryption requirements, and (2) a new HF Internet Protocol under development.
- Collaborate with U.S. Naval Forces Southern Command (SOUTHCOM), USN 4th Fleet, Joint Interagency Task Force-South (JIATF-S), and leverage experimentation work by U.S. Department of Defense research laboratories.

Notes
- Mission-Specific Long-Range Communication Options Identified: Jun 21
- Sponsor Briefed on Long-Range Communications Options: Jun 21
- Long-Range Communications Matrix Complete: Aug 21
- Mission-Specific Long-Range Communications Analysis (Brief): Sep 21
- Technology Demonstration Complete: Mar 22
- Mission-Specific Long-Range Communications Analysis (Report): Jun 22
- Project Completion: Jun 22

Sponsor: CG-761
Stakeholder(s): CG-68/751/791, C5ISC, CGCYBER, JIATF-S, LANT/PAC-6, SOUTH/FORCE/COMMCOM, ALC
RDC Research Lead: Mr. Robert Taylor
CG-926 Domain Lead: Ms. Holly Wendelin

Anticipated Transition: Knowledge Product
Influence Tactics, Techniques, & Procedures
High Frequency (HF) Radar

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

Objectives

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

Notes

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

Sponsor: CG-761  
Stakeholder(s): MIFC, CG-26/68/741/933, CSISC, LANT/PAC-6, DHS S&T BIM, SOUTHCOM, JIATF-S

RDC Research Lead: Mr. Sekaran Jambukesan  
CG-926 Domain Lead: Ms. Holly Wendelin

Anticipated Transition: Knowledge Product  
Future Technology

Project Timeline / Key Milestones

- Project Start: 1 Oct 20
- Completed HFSWR Capabilities Research: 17 Mar 21
- NRL Completed HF Data Collection, Analysis & Report: Aug 21
- High Frequency Surface Wave Radar Capabilities (Brief): Oct 21
- Technology Demonstration: May 22
- Identify Applicability to CG Missions: Aug 22
- Project Completion: Jan 23

Indicates RDC Product  
April 2021  
16
## Mission Need: Maintain competency/knowledge; provide rapid response; and external liaison.

### Objectives
- Maintain 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 and CG DCO/DCMS Research Priorities.
- Provide expert input to CG stakeholders regarding C5I technologies.
- Foster continued relationships with CG sponsors/stakeholders and external DoD labs, DHS S&T, and other government agency/academic partners.
- Provide CG Academy cadets and other academic institution students with internship opportunities.

### Notes
- Continue to provide Extended Reality (XR) subject matter expertise and technical support for HoloLens2 devices in support of RDC ITNET Branch.
- Bear Trap enhanced Maritime Domain Awareness effort with District 11.
- Complete a large-scale FirstNet evaluation at Sector San Francisco, including deployment at the sector, stations, air station, cutters & boats.

### Sponsor: CG-926

### Stakeholder(s): CG-2, CG-6, CG-7, CG-933, CSISC, CGCYBER, DHS S&T

### RDC Research Lead: Ms. Amy Cutting

### CG-926 Domain Lead: Ms. Holly Wendelin

### Anticipated Transition: Various

### Project Timeline / Key Milestones

<table>
<thead>
<tr>
<th>Project</th>
<th>Start Date</th>
<th>End Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Cost MDA Fusion Center</td>
<td>Ongoing</td>
<td>15 Dec 20</td>
</tr>
<tr>
<td>CG District 11 MDA “Bear Trap” Support</td>
<td>Ongoing</td>
<td>Apr 21</td>
</tr>
<tr>
<td>LED REACT Testing</td>
<td>Ongoing</td>
<td>Apr 21</td>
</tr>
<tr>
<td>Light Emitting Diode Electromagnetic Interference (REACT Report)</td>
<td>Ongoing</td>
<td>Jun 21</td>
</tr>
<tr>
<td>FirstNet Deployment – Sector San Francisco Units</td>
<td>Ongoing</td>
<td>Jun 21</td>
</tr>
<tr>
<td>FirstNet Sector Evaluation</td>
<td>Ongoing</td>
<td>Dec 21</td>
</tr>
</tbody>
</table>

### Project Completion: Ongoing
Mission Need: Improve In-Situ Burn (ISB) knowledge base to supplement oil spill response options.

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

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

Sponsor: EPA Great Lakes Nat’l Program Office, CG-MER
Stakeholder(s): CG-721, NSF, EPA, BSEE, D9, RRT5
RDC Research Lead: LT Liz Murphy
CG-926 Domain Lead: Ms. Karin Messenger

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

Project Timeline / Key Milestones
- Project Start: 1 Oct 18
- Mesoscale Freshwater Burns Complete: 19 Jul 19 ✓
- Large-scale Freshwater Burns Complete: 25 Oct 19 ✓
- Freshwater In-Situ Oil Burning (Report): 16 Feb 21 ✓
- Remote Air Monitoring Market Research Complete: 17 Feb 21 ✓
- Remote Air Monitoring Process Framework Complete: 11 Mar 21 ✓
- Test Plan for Remote Air Monitoring Complete: Apr 21
- Air Monitoring During Freshwater ISB: May 21
- Freshwater In-Situ Burning Air Monitoring (Report): Dec 21 ★
- Project Completion: Dec 21

Indicates RDC Product ★
Advancing UAS and AUV Capabilities to Characterize Water Column and Surface Oil in Ice Environments

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

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

Notes

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

Objectives

- Anticipated Transition: Product Fielded Prototype

Sponsor: CG-MER

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

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

CG-926 Domain Lead: Ms. Karin Messenger

Project Timeline / Key Milestones

- Interagency Reimbursable Work Agreement with NOAA Complete 3 Jun 20
- Phase 1: Unmanned Aircraft System (UAS)/Autonomous Underwater Vehicle (AUV) Tests at CRREL Complete Apr 21
- Laboratory Results and Way Ahead (Brief)  Jun 21
- UAS/AUV Lab Experiments Results (Report)  Aug 21
- Field Exercise Planning Complete Nov 21
- Phase 2: UAS/AUV Systems Field Testing in Great Lakes or Arctic Complete Dec 21
- Data Schema for Data Stream Export Complete Mar 22
- UAS/AUV Systems Field Exercise Integration (Report) May 22
- Project Completion: May 22

Indicates RDC Product ★
Behavior of Diluted Bitumen (Dilbit) in Fresh Water

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

- 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.

**Objectives**

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

**Notes**

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

**Sponsor:** CG-MER, CGD9  
**Stakeholder(s):** EPA Great Lakes Nat’l Program Office/Pollution Response Office, LANT-54, NOAA

**RDC Research Lead:** Benedette Adewale, PhD  
**CG-926 Domain Lead:** Ms. Karin Messenger

**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)** Apr 21
- **Dilbit Test Plan Complete** Apr 21
- **CRREL Dilbit Weathering Warm Weather Test Complete** Jun 21
- **CRREL Dilbit Weathering Cold Weather Test Complete** Nov 21
- **Dilbit Oil Analysis Complete** Jan 22
- **Guidance Document - Behavior of Diluted Bitumen in the Fresh Water Environment (Report)** May 22
- **Project Completion:** May 22

**Indicates RDC Product ★**
Survival Modeling, Reporting, and Statistics

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

### Objectives

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

### Notes

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

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

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

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

### Project 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 and Implementation (Brief)  
  30 Nov 20 ✓ ★
- Complete USARIEM Clothing Studies  
  Aug 21
- Complete NEDU Immersion Tests  
  Jan 22
- Enhanced USCG Survival Model and Implementation Guidance (Report)  
  Jul 22 ★

**Project Completion:** Jul 22
Mass Rescue Lifesaving Appliance (MRLSA)

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

- 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.

Objectives

- Partnership with Air Force Research Laboratory.
- 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.

Notes

- Partnership with Air Force Research Laboratory.
- 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.

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

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

Anticipated Transition: Product
- Fielded Prototype

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 ✓ ★
  - DHS Issues BAA Apr 21
  - Industry Day Webinar Complete May 21
  - Interim Brief Complete Sep 21
  - Prototype Development Complete May 22
  - Mass Rescue Lifesaving Appliance (Report) Sep 22 ★

Project Completion: Sep 22

Indicates RDC Product ★
Next Generation Aids to Navigation Buoys & Alternative Moorings

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

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

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

**Objectives**

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

**RDC Research Lead:** Mr. James Spilsbury  
**CG-926 Domain Lead:** Ms. Karin Messenger

**Anticipated Transition:** Knowledge Product  
**Acquisition Milestone Support**

**Project Start:** 1 Oct 19

<table>
<thead>
<tr>
<th>Milestone Description</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete World Wide Market Study of Buoys</td>
<td>31 Mar 20 ✔</td>
</tr>
<tr>
<td>Gather Feedback from Sponsor and Stakeholders</td>
<td>30 Jun 20 ✔</td>
</tr>
<tr>
<td>Selection Most Promising Buoys for Testing Complete</td>
<td>31 Aug 20 ✔</td>
</tr>
<tr>
<td>Next Generation Aids to Navigation Buoys: Market Study Report (Report)</td>
<td>17 Sep 20 ✔ ★</td>
</tr>
<tr>
<td>Draft Test Plan for Buoys and Moorings Complete</td>
<td>20 Oct 20 ✔</td>
</tr>
<tr>
<td>Engineering Design and Fabrication of Alternative Moorings Complete</td>
<td>Aug 21</td>
</tr>
<tr>
<td>Next Generation Buoy and Alternative Mooring Field Test Update (Brief)</td>
<td>Sep 21 ★</td>
</tr>
<tr>
<td>Field Test for Buoys and Moorings Complete</td>
<td>Oct 22</td>
</tr>
<tr>
<td>New Buoy Field Trial and Alternative Moorings Summary (Report)</td>
<td>Jul 23 ★</td>
</tr>
</tbody>
</table>

**Project Completion:** Jul 23
Nearshore and Inland Evaluation of the Estimated Recovery System Potential (ERSP) Calculator

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

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

**Notes**

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

**Objectives**

- Anticipated Transition:
  - Fielded Prototype

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

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

**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: May 21
- National Academy of Sciences (NAS) Review Complete: Nov 21
- NAS Response Review of Inland ERSP (White Paper): Apr 22
- NAS Recommended ERSP Calculator Updates Complete: May 23
- **Project Completion:** Aug 23

**Sponsor:** CG-MER

**Stakeholder(s):** BSEE, AREA-54

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

**CG-926 Domain Lead:** Ms. Karin Messenger

**Anticipated Transition:** Product

**Fielded Prototype**
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 Transition: Knowledge Product Standards/Regulations

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

Project Start: 1 Oct 17
Project Completion: Sep 23

Indicates RDC Product ★
Mission Need: Maintain competency/knowledge; provide rapid response; and external liaison.

Objectives

- Maintain RDC competency and technical knowledge in understanding present and future environment & waterways technology, systems, and regulatory directives/policies, including: environmental protection, pollution detection/response, ballast water standards, marine and navigation safety improvements, and search & 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 environment & waterways technologies.
- Foster continued relationships with CG sponsors/stakeholders and external DoD labs, DHS S&T, and other government agency/academic partners.
- Provide CG Academy cadets and other academic institution students with internship opportunities.

Notes

- Distress Signals Policy Council & RTCM meetings and special committees.
- Univ. Texas San Antonio machine learning for leeway (DHS/DoD funds).
- Michigan Technological University mass-rescue capstone effort.
- Ice accretion REACT project for F/V Scandies Rose MBI.
- Interagency Coordinating Committee on Oil Pollution Research.
- Great Lakes Oil Spill Center of Expertise membership.
- Introductory liaison for ballast water research on CGC HEALY.
- NOAA Response, Oil Assay Working Group.

Sponsor: CG-926

Stakeholder(s): CG-5, CG-SAR, CG-MER, CG-ENG, CG-OES, CGD9, CGD11, DHS S&T

RDC Research Lead: Mr. M. J. Lewandowski

CG-926 Domain Lead: Ms. Karin Messenger

Anticipated Transition: Various

Project Start: Ongoing

- Int’l Search Planning Focus Mtg: Search Plans From a Common Data Set 24 Jan 21 ✓
- CA Office of Spill Prevention & Response Tech Mtg 22 Feb 21 ✓
- BSEE /CG R&D Review and Planning Meeting 2 Mar 21 ✓
- Quarterly DISPOCO Meeting 18 Mar 21 ✓
- Quarterly ICCOPR Meeting 23 Mar 21 ✓
- Ice Accretion Testing at Cold Regions Research and Engineering Lab Jun 21
- International Oil Spill Conference May 21
- Machine Learning for Leeway (REACT Report) Aug 21 ★
- Ice Accretion on Crab Traps (REACT Report) Sep 21 ★

Project Completion: Ongoing

Indicates RDC Product ★

April 2021 26
Mission Need: Interoperable voice and high speed data communications within Sea Area A1.

- Leverage a Cooperative Research and Development Agreement (CRADA) to investigate U.S. Coast Guard (CG) operational use of the National Public Safety Broadband Network (commonly called FirstNet).
- Assess the feasibility and effectiveness of leveraging CG infrastructure (e.g., Rescue 21 towers) to enhance FirstNet designs.
- Adapt 4G/LTE technology for the maritime environment to best support the CG, public safety, U.S. Department of Defense, and Other Government Agencies within 20 nautical miles of shore.
  - Phase 1: Deploy handsets, FirstNet Enhanced Push To Talk (EPTT), blue force tracking, and Geosuite.
  - Phase 2: Optimize radio access network, FirstNet integrated dispatch console, and EPPT enhanced equipment.
  - Phase 3: Deploy Band 14 vessel routers.

Objectives

- Project includes use of a CRADA.
- Partners: FirstNet Program Office.

Notes

- Project Start: 1 Mar 18
- Limited User Evaluation Start: 1 Feb 19
- CG FirstNet Maritime Test Range: Phase 1: 1 Feb 19
- CG FirstNet Maritime Test Range: Phase 2: 19 Aug 19
- Coast Guard Nearshore Use of FirstNet (Brief): 22 Nov 19
- CG FirstNet Maritime Test Range: Phase 3: 31 Jan 20
- Conclude Sector Key West Full Scale Exercise: 11 Mar 20
- Limited User Evaluation End: 31 Mar 20
- Coast Guard Nearshore Use of FirstNet: Test Results and Recommendations (Report): 8 Dec 20
- Project Completion: 8 Dec 20

Sponsor: CG-67

Stakeholder(s): CG-255, CG-721/31/41/51/61/91, C4IT SC, LANT/PAC-6, C3CEN, TISCOM, D7, JIATF

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

CG-926 Domain Lead: Ms. Holly Wendelin

Anticipated Transition: Product

Fielded Prototype

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

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

- Improve IT performance in a degraded, disconnected, and high latency environment by performing a limited user evaluation of selected equipment on an afloat unit.
- Make recommendations to sponsor and stakeholders about best means of improving cutter IT application performance to include IP Video Compression on CG Communications Networks.

**Objectives**

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

**Notes**

**Sponsor:** CG-68  
**Stakeholder(s):** CG-761, C5ISC, CG-67, CGCYBER

**RDC Research Lead:** Mr. David Cote  
**CG-926 Domain Lead:** Ms. Holly Wendelin

**Anticipated Transition:** Knowledge Product  
*Acquisition Milestone Support*

**Project Timeline / Key Milestones**

- **Project Start:** 1 Oct 19
- **Review of CG Previous/Current Efforts Complete** 31 Dec 19 ✓
- **Evaluation of Network Accelerator Technology Complete** 28 Feb 20 ✓
- **Limited User Evaluation of Selected Equipment Complete** 18 Nov 20 ✓
- **Network Accelerator Tech Evaluation (Brief)** 29 Dec 20 ✓ ★
- **Investigation of Best Practices for Application Software Complete** Apr 21
- **Improve Cutter IT Application Performance (Report)** Jul 21 ★
- **Project Completion:** Jul 21

*Indicates RDC Product ★*
Mission Need: Improve mariner safety by hardening the AIS against cyber attacks.

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

Notes:

Objectives:

**Sponsor:** CG-761

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

**RDC Research Lead:** Ms. Anita Trombino

**CG-926 Domain Lead:** Ms. Holly Wendelin

**Anticipated Transition:** Knowledge Product Standards/Regulations

**Project Timeline / Key Milestones**

- **Project Start:** 1 Oct 19
- **Complete International Encryption Methods Research**
  - 30 Jun 20 ✔
- **AIS Data Authentication (Brief)**
  - 10 Nov 20 ✔ ★
- **High-level Operational Requirements to be Used to Drive Development Complete**
  - 22 Jan 21 ✔
- **Machine Learning and Other Algorithms Briefing**
  - 22 Feb 21 ✔
- **Machine Learning Applicability to AIS Complete**
  - Apr 21
- **AIS Machine Learning (Brief & Demonstration)**
  - Jun 21 ★
- **AIS Cyber Security (Report)**
  - Sep 21 ★
- **Project Completion:** Sep 21
Radio Frequency (RF) Communications in a Cloud Environment

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

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

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

**Project Timeline / Key Milestones**

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Start</td>
<td>12 Feb 20</td>
</tr>
<tr>
<td>CRADA Established</td>
<td>21 Jan 20</td>
</tr>
<tr>
<td>System Architecture Design Complete</td>
<td>27 Mar 20</td>
</tr>
<tr>
<td>Cloud Environment Established</td>
<td>22 Jun 20</td>
</tr>
<tr>
<td>Phase 1 R21 Cloud Prototype Deployed &amp; Connected</td>
<td>16 Jan 21</td>
</tr>
<tr>
<td>Phase 1 Testing Complete</td>
<td>Apr 21</td>
</tr>
<tr>
<td>RF Comms Cloud Suitability Phase 1 (Brief)</td>
<td>May 21</td>
</tr>
<tr>
<td>Phase 2 User Interface to CG1V Developed &amp; Deployed</td>
<td>Jul 21</td>
</tr>
<tr>
<td>Phase 2 Testing Complete</td>
<td>Aug 21</td>
</tr>
<tr>
<td>RF Comms Cloud Suitability (Report)</td>
<td>Sep 21</td>
</tr>
<tr>
<td>Project Completion</td>
<td>Sep 21</td>
</tr>
</tbody>
</table>

**Sponsor:** CG-761  
**Stakeholder(s):** CG-68, CG-67, CG-741, CG-SAR, C5ISC, CGCYBER

**RDC Research Lead:** Ms. Anita Trombino  
**CG-926 Domain Lead:** Ms. Holly Wendelin

**Anticipated Transition:** Product Fielded Prototype
Extended Reality (XR) Capabilities for Coast Guard Mission Support

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

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

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

### Sponsor: FORCECOM

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

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

### CG-926 Domain Lead: Ms. Holly Wendelin

### Anticipated Transition: Knowledge Product

Future Technology

### Project Timeline / Key Milestones

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market Research/Technology Assessment (Brief)</td>
<td>19 Dec 18 ✓</td>
</tr>
<tr>
<td>HoloLens 2 Upgrade Completed</td>
<td>3 Sep 20 ✓</td>
</tr>
<tr>
<td>87’ WPB Augmented Reality Maintenance Prototype Delivered</td>
<td>18 Sep 19 ✓</td>
</tr>
<tr>
<td>Aviation Augmented Reality Maintenance Prototype Delivered</td>
<td>2 Feb 21 ✓</td>
</tr>
<tr>
<td>Limited User Evaluation - Surface Community (Brief)</td>
<td>Apr 21 ★</td>
</tr>
<tr>
<td>Limited User Evaluation - Aviation Community (Brief)</td>
<td>Aug 21 ★</td>
</tr>
<tr>
<td>Marine Inspection XR Training Prototype Delivered</td>
<td>Sep 21</td>
</tr>
<tr>
<td>Limited User Evaluation - Training Community (Brief)</td>
<td>Feb 22 ★</td>
</tr>
<tr>
<td>Mission Support XR Roadmap Complete</td>
<td>Mar 22</td>
</tr>
<tr>
<td>XR Capabilities for CG Mission Support (Report &amp; Brief)</td>
<td>Jul 22 ★</td>
</tr>
</tbody>
</table>

**Project Start:** 30 Nov 17

**Project Completion:** Jul 22
**Mission Need:** Improve boarding team safety, security, & mission efficiency.

- Define protected, standards based mobile architectures to interface with U.S. Coast Guard (CG) Maritime and Avionic Systems.
  - Phase 1:
    - Investigate opportunities to partner with industry.
    - Collect requirements from Boarding Teams (BT), sponsor, and stakeholders.
    - Conduct COTS/GOTS Tactical Mobile Network technology architecture market research and use scoring methodology to rank candidates.
    - Develop, staff, and deliver Tactical Market Research document.
  - Phase 2:
    - Conduct Limited User Evaluation of selected technology architectures.
    - Develop, route, and deliver Tactical Mobile Technology Evaluation brief.
    - Evaluate best technology solution architectures to deploy technology.
    - Deliver Improve Cutter Boarding Team Efficiency report.

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

**Project Timeline / Key Milestones**

- **Project Start:** 1 Oct 20
  - Interviews w/CG Cutter BTs and Policy Makers Completed: 23 Dec 20
  - Review of CG Previous/Current Efforts Completed: 23 Dec 20
  - Tactical Mobile COTS/GOTS Tech Evaluation Completed: 31 Mar 21
  - **Tactical Mobile Technology Market Research (Report) May 21**
  - Selected Technology Limited User Evaluation Completed: Sep 21
  - **Tactical Mobile Technology Evaluation (Brief) Nov 21**
  - Deployment Solution Architecture Evaluation Completed: Mar 22
  - Selected Solution Architecture Evaluation Completed: May 22
  - **Improve Cutter Boarding Team Efficiency (Report) Jul 22**
- **Project Completion:** Jul 22

**Sponsor:** CG-761

**Stakeholder(s):** CG-67/68/721/751/932, CG-MLE, LANT, PAC, CSISC, CGCYBER, TACLETS

**RDC Research Lead:** Mr. David Cote

**CG-926 Domain Lead:** Ms. Holly Wendelin

**Anticipated Transition:** Product

**Fielded Prototype**
High Latitude Underway Connectivity

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

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

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

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

Project Timeline / Key Milestones:
- Project Start: 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 Cutter Connectivity Test Bed (Brief): Jun 21
- Limited User Evaluation Complete: Apr 22
- High Latitude Underway Connectivity (Report): Sep 22
- Project Completion: Sep 22

Indicates RDC Product ★
April 2021 33
Evaluation and Testing of VHF Data Exchange System (VDES) Impacts on the Automatic Identification System (AIS)

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

### Objectives

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

### Notes

- Work closely with 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 VDE and AIS.

### Sponsor:

- CG-761

### Stakeholder(s):

- CG-67, CG-68, CG-9335, CG-NAV, NAVCEN, CSISC

### RDC Research Lead:

- LCDR John Forster

### CG-926 Domain Lead:

- Ms. Holly Wendelin

### Anticipated Transition:

- Knowledge Product
- *Future Technology*

### Project Timeline / Key Milestones

- **Project Start:** 1 Oct 19
- **Technology Roadmap Investigation Complete** 30 Sep 20 ✓
- **Very High Frequency Data Exchange System (VDES) Technology Roadmap (Report)** 27 Jan 20 ★
- **Test Plan-Equipment Integration- Lab Test Complete** 5 Mar 21 ✓
- **Phase 1 Field Trials – VDES Evaluation of CG Tactical Data Transmission - Limited User Eval Complete** Oct 21
- **Sensitive but Unclassified Tactical Information Exchange and Display System Using VHF Data Exchange System (Report)** Dec 21 ★
- **Phase 2 Field Trials – VDES Evaluation of the Dissemination of MSI - Limited User Eval Complete** Oct 22
- **VHF Data Exchange System Field Trial (Report & Brief)** Mar 23 ★
- **Project Completion:** Mar 23
# FY21-22 IT & Networks (ITNET) Branch Support

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

<table>
<thead>
<tr>
<th>Objectives</th>
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<tbody>
<tr>
<td>▪ Build RDC competency and technical knowledge and understanding of innovative Information Technology, Networked Systems &amp; Cyber Tools, including: Coast Guard mobility, software prototyping, cloud computing, software defined networks, mixed reality, telecommunications, space based systems, cyber security systems.</td>
</tr>
<tr>
<td>▪ Evaluate efficient information storage, management and knowledge tech.</td>
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<tr>
<td>▪ Support ITNET Strategic Project Portfolio Alignment and CG DCO/DCMS Research Priorities.</td>
</tr>
<tr>
<td>▪ Provide expert input to CG stakeholders regarding ITNET technologies.</td>
</tr>
<tr>
<td>▪ Establish robust relationships with CG sponsors/stakeholders and external DoD labs, DHS S&amp;T, and other government agency/academic partners.</td>
</tr>
<tr>
<td>▪ Provide CG Academy cadets and other academic institution students with internship opportunities.</td>
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<tr>
<td>▪ Build lean application evaluation platform to provide effective recommendations to Program Managers and Product Line Managers.</td>
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</tbody>
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<tr>
<th>Notes</th>
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<tbody>
<tr>
<td>▪ Continue to plan and execute RDC infrastructure improvements that will benefit USCG: P-LAN, audio/visual updates, Hi-Latitude communications lab, Light-Fidelity (LiFi) test lab, Team Awareness Kit (TAK) hosting, C5ISC Cutter Lab mockup, computer forensics/cyber test bed.</td>
</tr>
<tr>
<td>▪ Continue FirstNet Mission-Critical Push to Talk (MCPTT) evaluation.</td>
</tr>
<tr>
<td>▪ Member of Maritime Security Regimes &amp; TRIDENT Warrior Working Groups.</td>
</tr>
<tr>
<td>▪ Member of Artic Communications Working Group.</td>
</tr>
<tr>
<td>▪ Member of Information Warfare Science &amp; Engineering Working Group.</td>
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<thead>
<tr>
<th>Sponsor: CG-926</th>
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<tbody>
<tr>
<td><strong>Stakeholder(s):</strong> CG-2, CG-6, CG-7, CSISC, CGCYBER, DHS S&amp;T</td>
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<thead>
<tr>
<th>RDC Research Lead: Mr. Rob Riley</th>
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<tbody>
<tr>
<td><strong>CG-926 Domain Lead:</strong> Ms. Holly Wendelin</td>
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<tr>
<th>Anticipated Transition: Various</th>
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<tr>
<th>Project Timeline / Key Milestones</th>
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<tbody>
<tr>
<td><strong>Project Start:</strong> Ongoing</td>
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<tr>
<th>Event</th>
<th>Date</th>
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</thead>
<tbody>
<tr>
<td>FirstNet Deployment Effort (w/ C5I Branch)</td>
<td>Jun 21</td>
</tr>
<tr>
<td>Hi-Latitude Communications Lab Testing</td>
<td>Nov 21</td>
</tr>
<tr>
<td>FirstNet MCPTT Hardware Test Bed</td>
<td>Apr 22</td>
</tr>
</tbody>
</table>

**Project Completion: Ongoing**
Research into Navigational Safety Risk Modeling and Analysis Tool

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

Objectives

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

Notes

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

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

RDC Research Lead: Ms. Christine Hansen
CG-926 Domain Lead: Dr. David Wiesenhahn

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

Project Timeline / Key Milestones

- Project Start: 3 Oct 16
- Risk Modeling Tools Assessed: 31 Aug 18
- Automatic Identification System Risk Modeling Data Package Created: 5 Dec 18
- Offshore Energy Risk Assessment Tool Envisioned: 31 May 19
- Test Risk Modeling Package Created: 26 Jul 19
- Assessment Tool and Methodology Refined: 1 Sep 20
- Project Completion: 31 Dec 20
**Mission Need:** Demonstrate the value and application of machine learning for improving USCG tools.

### Objectives

- Initial review will provide an understanding of current AI/ML uses in the CG, U.S. Department of Defense (DoD), and U.S. Department of Homeland Security (DHS).
- Project will result in a clear understanding of AI/ML uses to support CG missions.
- Project will identify promising AI/ML technologies for incorporation into CG applications, as well as any infeasible technologies or those that are not yet mature enough to support CG applications.
- Proof of Concept will demonstrate selected use case from CG Ideas at Work campaign and positive impact to CG mission outcomes.

### Notes

- Potential partnerships with other service organizations in R&D.
- Leverage AI/ML efforts by DoD and DoE labs, MIT Lincoln Laboratory, and Argonne National Laboratory.
- Conduct a literature review of current DoD applications.

### Sponsor: CG-771  
**RDC Research Lead:** Mr. Sam Cheung  
**CG-926 Domain Lead:** Dr. David Wiesenbahn

### Stakeholder(s): CG-761

### Project Timeline / Key Milestones

<table>
<thead>
<tr>
<th>Event Description</th>
<th>Completion Date</th>
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</thead>
<tbody>
<tr>
<td>Identification of High-level Application Areas for AI/ML Solutions Completed</td>
<td>30 Jun 20</td>
</tr>
<tr>
<td>Review Current DoD, DHS, and USCG Applications for AI/ML and Identify Application Area for Solution Development Completed</td>
<td>28 Sep 20</td>
</tr>
<tr>
<td>Develop and Document Proof of Concept for Rescue 21 (Selected Application Area)</td>
<td>25 Feb 21</td>
</tr>
<tr>
<td>Proof of Concept IBM Watson (Proof of Concept)</td>
<td>Apr 21</td>
</tr>
<tr>
<td>Machine Learning Platforms to Improve Coast Guard Tools (Report)</td>
<td>Jul 21</td>
</tr>
</tbody>
</table>

### Project Start: **1 Oct 19**

### Anticipated Transition: Knowledge Product

*Influence Tactics, Techniques, & Procedures*
# Condition-Based Maintenance (CBM) for Coast Guard Asset Product Lines

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

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

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

### Sponsor:
CG-45, CG-41

### Stakeholder(s):
SFLC, ALC

### RDC Research Lead:
Ms. Christine Hansen

### CG-926 Domain Lead:
Dr. David Wiesenhahn

### Anticipated Transition:
Knowledge Product
*Acquisition Milestone Support*

### Project Timeline / Key Milestones

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Asset Maintenance Characteristics Reviewed</td>
<td>1 Apr 19</td>
</tr>
<tr>
<td>Surface CBM Market Research Initiated</td>
<td>29 Oct 19</td>
</tr>
<tr>
<td>Academic Partnership Engagement Initiated</td>
<td>1 Dec 19</td>
</tr>
<tr>
<td>CBM for CG Asset Product Lines (Brief)</td>
<td>14 Feb 20</td>
</tr>
<tr>
<td>Aviation Asset Maintenance Characteristics Reviewed</td>
<td>15 Feb 20</td>
</tr>
<tr>
<td>Aviation CBM Market Research Initiated</td>
<td>1 Oct 20</td>
</tr>
<tr>
<td>CBM for CG Asset Product Lines Summary Report (Report)</td>
<td>Sep 21</td>
</tr>
</tbody>
</table>

### Project Start:
1 Apr 19

### Project Completion:
Sep 21
# Applications of Robotic Process Automation

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

## Objectives

- Provide an understanding of the current state of RPA.
- Identify challenges to acquiring and implementing RPA solutions.

## Notes

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

## Project Timeline / Key Milestones

<table>
<thead>
<tr>
<th>Project Milestone</th>
<th>Date</th>
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</thead>
<tbody>
<tr>
<td>Identification of RPA Candidate Criteria/Method</td>
<td>20 Jan 21</td>
</tr>
<tr>
<td>FINCEN Effort/Progress Research, Literature Review</td>
<td>29 Jan 21</td>
</tr>
<tr>
<td>Identification of RPA Prototype Use-case</td>
<td>Apr 21</td>
</tr>
<tr>
<td>Applications of Robotic Process Automation: Use-case Selection (Brief)</td>
<td>May 21</td>
</tr>
<tr>
<td>Prototype Development and Evaluation Completed</td>
<td>Dec 22</td>
</tr>
<tr>
<td>Applications of Robotic Process Automation (Report)</td>
<td>Feb 23</td>
</tr>
</tbody>
</table>

## Sponsor

- **Sponsor:** CG-67

## Stakeholder(s)

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

## RDC Research Lead

- **RDC Research Lead:** LT David Kent

## CG-926 Domain Lead

- **CG-926 Domain Lead:** Dr. David Wiesenhahn

## Anticipated Transition

- **Anticipated Transition:** Knowledge Product
- *Influence Tactics, Techniques, & Procedures*
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.
- 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 Blue Technology Center of Expertise, Naval Health Research Center in San Diego, CG Auxiliary, and DoD Special Operations.

Sponsor: CG-721

Stakeholder(s): FORCENCOM, 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 Transition: Knowledge Product

Influence Tactics, Techniques, & Procedures

Project Timeline / Key Milestones

Project Start: 30 Nov 2020

- Researched Objective Measures 31 Mar 21
- Experimental Design and Cognitive Training Market Research Selection (Brief) Jan 22
- Awarded Contract Training Program Aug 22
- Pre-Training Assessment Completed Oct 22
- Cognitive Training Programs Completed Jan 23
- Post-Training Assessment Completed Jan 23

Project Completion: Aug 23

Indicates RDC Product
Maritime Unmanned System Technology (MUST)

Mission Need: Persistent maritime domain awareness using AUSVs.

- 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 (CONOPs), including:
  - Effectiveness of single and multiple (teaming/swarming) AUSVs; and
  - Effectiveness of AUSV and unmanned aerial system teaming.
- Inform field testing using modeling analysis results.

Objectives

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

Notes

Sponsor: DHS S&T BIM, CG-26
Stakeholder(s): CG-721, CG-MLE
RDC Research Lead: Mr. Ross Vassallo
CG-926 Domain Lead: Mr. Scott Craig
Anticipated Transition: Knowledge Product Future Technology

Project Timeline / Key Milestones

- Project Start: 1 Oct 19
- In House or Contracted Modeling KDP: 23 Sep 20
- Vehicle Operations and Control Training: Apr 21
- Contract for Modeling Effort Established: Sep 21
- Model Scope and Application S/W Established: Oct 21
- MUST – Modeling Progress Status (Brief): Dec 21
- MUST - Modeling Effort Contract Completed: Nov 22
- MUST – Model Simulation Results (Brief): Dec 22
- MUST – FY23 Test & Evaluation Progress Update (Brief): Jun 23
- Support for DHS MUST Operational Testing Completed: Sep 23
- Maritime Unmanned System Technology (Report): Nov 23
- Project Completion: Nov 23
**Mission Need:** Maintain competency/knowledge; provide rapid response; and external liaison.

<table>
<thead>
<tr>
<th>Objectives</th>
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<tbody>
<tr>
<td>▪ Maintain competency and technical knowledge in understanding present and future Operations Research / Data Analytics (OR/DA) tools and techniques including: modeling &amp; simulation, data analytics, Artificial Intelligence (AI) &amp; Machine Learning (ML), process automation, risk analysis, and human factors.</td>
</tr>
<tr>
<td>▪ Maintain Branch infrastructure to support RDC portfolio objectives.</td>
</tr>
<tr>
<td>▪ Support MSA Strategic Project Portfolio Alignment and CG DCO/DCMS Research Priorities.</td>
</tr>
<tr>
<td>▪ Provide expert input to CG stakeholders regarding use and application of AI/ML and OR/DA technologies and techniques.</td>
</tr>
<tr>
<td>▪ Foster continued relationships with CG sponsors/stakeholders and external DoD labs, DHS S&amp;T, and other government agency/academic partners.</td>
</tr>
<tr>
<td>▪ Provide CG Academy cadets and other academic institution students with internship opportunities.</td>
</tr>
</tbody>
</table>

| Notes |
|=======|
| ▪ Represent CG on Joint Artificial Intelligence Center (JAIC) Service Lab AI R&D Subcommittee. |
| ▪ Represent CG on JAIC Predictive Maintenance (PMx) Subcommittee. |
| ▪ Represent CG on Tri-Service Lab Commander’s Sync Data Analytics WG. |
| ▪ Member of CG-7 UxS IPT (AI Subcommittee). |
| ▪ Member of CG OR/DA WG and Data Readiness Task Force Advisory Group. |
| ▪ Member of USCG Modeling & Simulation Advisory Council. |
| ▪ Co-Chair of RDC Institutional Review Board. |

<table>
<thead>
<tr>
<th>Sponsor: CG-926</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stakeholder(s): CG-2/6/7/9, CG-MLE, CG-SAR, CG-CPE, CG-5PW, CG-INV, CG-NAV, DCO-X, DHS S&amp;T</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RDC Research Lead: CDR Daniel Sweigart</th>
</tr>
</thead>
<tbody>
<tr>
<td>CG-926 Domain Lead: Dr. David Wiesenhahn</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Anticipated Transition: Various</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Project Timeline / Key Milestones</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project Start:</strong> Ongoing</td>
</tr>
<tr>
<td>Project Evergreen (2030) Participation</td>
</tr>
<tr>
<td>Low Cost MDA – Ongoing Support</td>
</tr>
<tr>
<td>Quarterly DISPOCO Meeting (Quant Subcommittee)</td>
</tr>
<tr>
<td>CG District 11 MDA “Bear Trap” Support</td>
</tr>
<tr>
<td>Post-Completion Report Analytics</td>
</tr>
<tr>
<td>Navigation Safety Risk Assessment Follow Up/Alpha Test</td>
</tr>
<tr>
<td>AI/ML/OR/DA Workforce and Training Needs Assessment</td>
</tr>
<tr>
<td>Host USNA Cadet Summer Intern (Virtual)</td>
</tr>
<tr>
<td>Blockchain Use-Case Exploration (w/ potential DHS funded researcher)</td>
</tr>
<tr>
<td>NLP Analysis of Unstructured SAR Narratives</td>
</tr>
</tbody>
</table>

| Project Completion: Ongoing |
Arctic Technology Evaluation 2019-2020

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

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

Notes:

Objectives:

Sponsor: CG-7
Stakeholder(s): CG-5PW, CG-751, CG-761, PAC-5, LANT-5, D17
RDC Research Lead: Mr. Scot Tripp
CG-926 Domain Lead: Ms. Holly Wendelin

Anticipated Transition: Knowledge Product

Project Timeline / Key Milestones:
- Project Start: 3 Dec 18
- Partners/Technologies/Test Plans Identified (FY19) 14 Jun 19
- FY20 Research Efforts/Partners Solicited 30 Aug 19
- CGC HEALY Tests/Demonstrations Complete (FY19) 28 Oct 19
- Arctic Technology Evaluation 2019 – Communications Technology Focus (Application Note) 30 Apr 20
- Partners/Technologies Scheduled (FY20) 14 Jul 20
- CGC CAMPBELL Tests/Demonstrations Complete (FY20) 2 Oct 20
- FY21 Research Efforts/Partners Solicited 28 Oct 20
- Arctic Technology Evaluation FY20 (Application Note) 29 Dec 20
- Project Completion: 29 Dec 20

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

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

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

Objectives:
- Request for Information for Industry Engagement Issued 30 Sep 18
- Request for Proposal for Field Demonstrations Issued 7 Nov 19
- Technology Demonstration Contracts Awarded 7 Feb 20
- Low-Cost Maritime Domain Awareness Pilot Study Status Brief Complete 27 Aug 20
- Field Demonstration Complete 7 Nov 20
- Low-Cost Maritime Domain Awareness Pilot Study (Report) Apr 21

Project Start: 6 Jun 18

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

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

Anticipated Transition: Knowledge Product
Future Technology

Project Completion: Apr 21
# Mission Need
Evaluate newer, less hazardous water purification systems.

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

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

## Sponsor
Surface Force Logistics Center (SFLC)

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

## RDC Research Lead
Ms. D. J. Hastings

## CG-926 Domain Lead
LT Steve Hager

## Anticipated Transition
Product
*Pending Acquisition*

### Project Timeline / Key Milestones

<table>
<thead>
<tr>
<th>Project</th>
<th>Milestone Description</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project</td>
<td>Bromine-Free Water Purification Partners Identified and Pilot Study Started</td>
<td>19 Jun 20</td>
</tr>
<tr>
<td></td>
<td>Bromine-Free Water Purification System Pilot Study (Brief)</td>
<td>9 Jul 20</td>
</tr>
<tr>
<td></td>
<td>Bromine-Free Water Purification Systems Pilot Feasibility Analysis Complete</td>
<td>Apr 21</td>
</tr>
<tr>
<td></td>
<td>Bromine-Free Water Purification System Pilot Study (Report)</td>
<td>Jul 21</td>
</tr>
<tr>
<td></td>
<td>Project Completion</td>
<td>Jul 21</td>
</tr>
</tbody>
</table>

Indicates RDC Product

April 2021

5507
Counter Unmanned Underwater Vehicle (C-UUV)/Anti-Swimmer Technology

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

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

**Notes**

- Building on past U.S. Coast Guard (CG) Research and Development Center anti-swimmer work.
- Exploring Cooperative Research and Development Agreements (CRADA) to support LUE.

**Objectives**

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

**Sponsor:** CG-721

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

**RDC Research Lead:** C-UUV Research Team

**CG-926 Domain Lead:** C-UUV Research Team

**Anticipated Transition:** Knowledge Product

*Future Technology*

Please e-mail RDC-Info@uscg.mil for information concerning the Milestones and Deliverable Schedule.
## Mission Need: Improved accuracy and reliability in multifunction chemical detection.

- 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
- Leverages past CG Research and Development Project 5802: Maritime Trace Narcotic Identification/Verification.

### 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.**

### Sponsor: CG-721
**Stakeholder(s):** DSF, NSF, CG-MLE, DHS S&T, CG-1B3, FORCOCOM

### RDC Research Lead: Ms. D.J. Hastings
**CG-926 Domain Lead:** LT Steve Hager

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

### Project Timeline / Key Milestones

<table>
<thead>
<tr>
<th>Project Start</th>
<th>Handheld Illicit Drug – Explosive Trace Detector (HID-ETD) Technical Evaluation CG Feedback Submitted</th>
<th>21 Apr 20</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DHS System Assessment and Validation for Emergency Responders (SAVER) Detector Analysis Started</td>
<td>30 Jun 20</td>
</tr>
<tr>
<td></td>
<td>HID-ETD Limited User Evaluation (LUE) Plan Developed and Devices Obtained</td>
<td>Apr 21</td>
</tr>
<tr>
<td></td>
<td>Drug and Explosives Detection System Assessment and Validation for Emergency Responders (Report)</td>
<td>Jun 21</td>
</tr>
<tr>
<td></td>
<td>HID-ETD LUE Completed</td>
<td>Aug 21</td>
</tr>
<tr>
<td></td>
<td>Handheld Illicit Drug – Explosives Trace Detector (Report)</td>
<td>Sep 21</td>
</tr>
<tr>
<td></td>
<td>Project Completion: Sep 21</td>
<td></td>
</tr>
</tbody>
</table>

Indicates RDC Product ★

April 2021 47
Mission Need: Cold spray restoration of vessel and aircraft components to support mission readiness.

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

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

<table>
<thead>
<tr>
<th>Sponsor: CG-41</th>
<th>Stakeholder(s): CG-45, CG-711, SFLC, ALC</th>
</tr>
</thead>
<tbody>
<tr>
<td>RDC Research Lead: LT Ryan Huebner</td>
<td>CG-926 Domain Lead: LT Steve Hager</td>
</tr>
<tr>
<td>Anticipated Transition: Knowledge Product</td>
<td>Future Technology</td>
</tr>
</tbody>
</table>

Project Start: 1 Oct 20

- Visit to Department of Defense (DoD) and Commercial Cold Spray Facilities Complete Apr 21
- Parts identified, Restored, and Tested for Repair Quality May 21
- Cold Spray Restoration of Vessel and Aircraft Components (Brief) Jul 21
- Cost Benefit Analysis: DoD vs. Commercial vs. CG Facility Complete Jan 22
- Cold Spray Restoration of Vessel and Aircraft Components (Report) Mar 22

Project Completion: Mar 22

Indicates RDC Product ✧
# Enhanced Rotary Wing Night Vision Goggle (NVG) Searches

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

**Objectives**

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

**Notes**

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

**Sponsor:** CG-SAR  
**Stakeholder(s):** CG-1B3, CG-711, CG-761, CG-41, ALC, ATC, LANT, PAC, FORCENCOM

**RDC Research Lead:** Mr. Mike Coleman  
**CG-926 Domain Lead:** LT Steve Hager

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

**Project Timeline / Key Milestones**

- **Project Start:** 1 Oct 20
- **Commercial/Military Lab NVG & Lighting Advancements Investigated:** May 21
- **Technologies Selected for LUE:** Jul 21
- **Augmented Lighting Down-select (Brief):** Aug 21
- **LUE Test Plan Developed and Technologies Acquired:** Jan 22
- **LUE Completed:** Mar 22
- **Enhanced TTP Recommendations Developed:** Jun 22
- **Augmented Lighting for NVG Searches Limited User Evaluation (Report):** Sep 22
- **Project Completion:** Sep 22
Mission Need: Provide support to relevant research efforts in the Polar Regions.

- 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:

Objectives

Project Timeline / Key Milestones

<table>
<thead>
<tr>
<th>Event Description</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partners/Technologies/Test Plans Identified (FY21)</td>
<td>May 21</td>
</tr>
<tr>
<td>FY21 Research Efforts/Partners Solicited</td>
<td>May 21</td>
</tr>
<tr>
<td>Tests/Demonstrations Complete (FY21)</td>
<td>Nov 21</td>
</tr>
<tr>
<td>Polar Technology Evaluation FY21 (Application Note)</td>
<td>Mar 22 ★</td>
</tr>
<tr>
<td>Partners/Technologies/Test Plans Identified (FY22)</td>
<td>Apr 22</td>
</tr>
<tr>
<td>FY22 Research Efforts/Partners Solicited</td>
<td>May 22</td>
</tr>
<tr>
<td>Tests/Demonstrations Complete (FY22)</td>
<td>Oct 22</td>
</tr>
<tr>
<td>Polar Technology Evaluation FY22 (Application Note)</td>
<td>Mar 23 ★</td>
</tr>
</tbody>
</table>

RDC Research Lead: Mr. Scot Tripp

CG-926 Domain Lead: Ms. Karin Messenger

Anticipated Transition: Knowledge Product

Future Technology

Project Completion: Mar 23

Indicates RDC Product ★
## FY21-22 Surface Branch Support

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

### Objectives
- Maintain 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, CBRNE 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 DoD labs, DHS S&T, and other government agency/academic partners.
- Provide CG Academy cadets and other academic institution students with internship opportunities.

### Notes
- Complete Hailing Acoustic Laser Light Tactical System (HALLTS) support.
- Complete corrosion control and monitoring evaluation.
- Complete D13 rough bar illumination research.
- RDC Arctic/Polar Coordinator and Representative to U.S. Arctic Research Commission.

### Sponsor:
CG-926

### Stakeholder(s):
CG-43, CG-45, CG-5PW, CG-721, CG-731, CG-751, CG-932, SFLC, CGD17, DHS S&T

### RDC Research Lead:
LTJG Torres-Rivera

### CG-926 Domain Lead:
LT Steve Hager

### Anticipated Transition:
Various

### Project Timeline / Key Milestones

<table>
<thead>
<tr>
<th>Project</th>
<th>Start</th>
<th>End</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rough Bar Illumination (REACT Report)</td>
<td>Apr 21</td>
<td></td>
</tr>
<tr>
<td>CG-HALLTS Field Support Completed</td>
<td>Jun 21</td>
<td></td>
</tr>
<tr>
<td>Corrosion Control and Monitoring (Technical Note)</td>
<td>Apr 22</td>
<td></td>
</tr>
</tbody>
</table>

### Project Completion:
Ongoing

Indicates RDC Product

April 2021
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.

<table>
<thead>
<tr>
<th>STIC Note Title</th>
<th>Objective</th>
<th>Office Supported</th>
<th>Due/Delivery Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>MH-65 Maintenance Kit</td>
<td><em>Determine if off-the-shelf MH-65 Deck Plate bolt storage system improved the maintenance task sufficiently to justify cost.</em></td>
<td>CG-41, ALC</td>
<td>30 Nov 20</td>
</tr>
<tr>
<td>Enhanced Hearing Personal Protective Equipment</td>
<td><em>Improve communication among marine inspectors in noisy environments while reducing energy of frequencies that can damage human hearing.</em></td>
<td>Boarding and Inspection Teams</td>
<td>30 Nov 20</td>
</tr>
<tr>
<td>Imaging Sonar Evaluations</td>
<td><em>Improve underwater situational awareness for various missions including Ports, Waterways, and Coastal Security; disaster recovery (Captain of the Port support); and SAR.</em></td>
<td>CG-721</td>
<td>13 Jan 21</td>
</tr>
<tr>
<td>Handheld Forward-looking Infrared Technology</td>
<td><em>Support small boat Ports, Waterways, and Coastal Security mission execution improvement by providing night time imaging.</em></td>
<td>CG-721</td>
<td>22 Feb 21</td>
</tr>
<tr>
<td>Small Boat Wash System</td>
<td><em>Prevent environmental contamination by filtering wash water for spoils and releasing filtered water.</em></td>
<td>Alameda Naval Engineering</td>
<td>24 Feb 21</td>
</tr>
<tr>
<td>Remotely Operated Lifesaving Devices</td>
<td><em>Support Search and Rescue mission execution from shore-side and nearshore.</em></td>
<td>CG-SAR</td>
<td>23 Mar 21</td>
</tr>
<tr>
<td>Light-emitting Diode Safety Lighting</td>
<td><em>Improve safety in operations including firefighting and hoist operations using lighted collars around hoisting hooks.</em></td>
<td>CG-1131, ALC</td>
<td>May 21</td>
</tr>
<tr>
<td>Narcotics Enforcement Go-Kits</td>
<td><em>Support counter drug mission Presidential Order to increase operations in SOUTHCOM area of operations.</em></td>
<td>CG-721</td>
<td>May 21</td>
</tr>
<tr>
<td>Laser Corrosion Removal</td>
<td><em>Improve maintenance on boats and aircraft by using proven laser technology for corrosion removal.</em></td>
<td>SFLC ESD</td>
<td>Jul 21</td>
</tr>
</tbody>
</table>

For more information, call (860) 271-2600 or e-mail RDC-Info@uscg.mil.
### Science & Technology Innovation Center (CG-STIC) Tasks (Cont’d)

<table>
<thead>
<tr>
<th>STIC Note Title</th>
<th>Objective</th>
<th>Office Supported</th>
<th>Due/Delivery Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile Tethered Video Systems</td>
<td>Improve maritime domain awareness from land-based surveillance balloon.</td>
<td>CG-721</td>
<td>Aug 21</td>
</tr>
<tr>
<td>Teleoperated Response Boat-Small Proof Of Concept</td>
<td>Support Ports, Waterways, and Coastal Security mission in accordance with Commandant strategy to use unmanned and autonomous systems to conduct missions.</td>
<td>CG-731</td>
<td>Aug 21</td>
</tr>
<tr>
<td>Stabilized Binoculars</td>
<td>Determine if hand-held stabilized binoculars are worth their added cost and complication, and for which types of units they work best.</td>
<td>CG-731,741,751</td>
<td>Aug 21</td>
</tr>
<tr>
<td>Inland Brush Cutter</td>
<td>Improve Aids to Navigation mission execution and reduce injuries and crew downtime from poison ivy and snake bites.</td>
<td>D-8</td>
<td>Sep 21</td>
</tr>
<tr>
<td>Diesel Outboard Engines</td>
<td>Long term user evaluation to support single-fuel concept which will reduce cost due to efficient infrastructure by eliminating duplicate framework.</td>
<td>CG-731</td>
<td>Sep 21</td>
</tr>
<tr>
<td>3D Metal Printing</td>
<td>Work towards overcoming obsolescence and supply chain shortages for various metal parts; work is for all CG communities, but focused on surface and aviation.</td>
<td>ALC, CGA, CG-4</td>
<td>Nov 21</td>
</tr>
</tbody>
</table>

CG-STIC Funding Type: DHS S&T  
RDC Research Lead: LCDR Anderson Ogg  
CG-926 Domain Lead: Ms. Minh-Thu Phan

For more information, call (860) 271-2600 or e-mail RDC-Info@uscg.mil.
**Mission Need:** Increase unity, share knowledge, build innovation culture, and transition technology.

### Objectives
- Maintain RDC competency and technical knowledge in understanding present and future technology to support CG mission execution.
- Maintain a collaborative relationship between the U.S. Coast Guard’s Research, Development, Test and Evaluation (RDT&E) Program Office and the Department of Homeland Security (DHS) Science & Technology (S&T) Directorate 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 Alignment and CG DCO/DCMS Research Priorities.
- Provide expert input to CG stakeholders regarding advanced technologies.
- Provide CG Academy cadets and other academic institution students with internship opportunities.

### Notes
- Align with DHS S&T Integrated Project Team gaps and CG Idea Submission Review input.
- Support Bear Trap enhanced Maritime Domain Awareness effort with District 11.
- Support Research and Development Center tasks as requested.

### Project Timeline / Key Milestones

<table>
<thead>
<tr>
<th>Project</th>
<th>Start</th>
<th>End</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Profile Drone Vessel Analysis (REACT Report)</td>
<td>19 Mar 21</td>
<td></td>
</tr>
<tr>
<td>CG District 11 MDA “Bear Trap” Support</td>
<td>Apr 21</td>
<td></td>
</tr>
<tr>
<td>FY21 Support</td>
<td>Sep 21</td>
<td></td>
</tr>
<tr>
<td>FY22 Support</td>
<td>Sep 22</td>
<td></td>
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</tbody>
</table>

### Sponsor:
- CG-926

### Stakeholder(s):
- DHS S&T, Various

### RDC Research Lead:
- Mr. Timothy Hughes

### CG-926 Domain Lead:
- Ms. Minh-Thu Phan

### Anticipated Transition:
- Various