

HOW TO IMPROVE THE EFFICIENCY, SAFETY, AND SECURITY OF MARITIME TRANSPORTATION: BETTER USE AND INTEGRATION OF MARITIME DOMAIN AWARENESS DATA

(113-33)

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July 26, 2013

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SUMMARY OF SUBJECT MATTER

TO: Members, Subcommittee on Coast Guard and Maritime Transportation
FROM: Staff, Subcommittee on Coast Guard and Maritime Transportation
RE: Hearing on "How to Improve the Efficiency, Safety and Security of Maritime Transportation: Better Use and Integration of Maritime Domain Awareness Data."

PURPOSE

The Subcommittee on Coast Guard and Maritime Transportation will meet on Wednesday, July 31, 2013, at 10:00 a.m., in 2167 of the Rayburn House Office Building to review Coast Guard maritime domain awareness (MDA) programs and whether such programs are improving the efficiency, safety, and security of maritime transportation. The Subcommittee will hear from the United States Coast Guard, the Government Accountability Office (GAO), and MDA stakeholders in private industry and academia.

BACKGROUND

Maritime Domain Awareness

MDA is the federal government's effort to achieve an understanding of anything in the global maritime environment that can affect the security, safety, economy, or environment of the United States. The process of achieving MDA includes: (1) collection of information, (2) fusion of information from different sources, (3) analysis through the evaluation and interpretation of information, and (4) dissemination of information to decision makers. The goal is to identify risks and threats in a timely manner and provide actionable intelligence.

Information Collection

The Coast Guard uses the following systems to collect information on the maritime domain:

Automatic Identification System

Automatic Identification System (AIS) is a Very High Frequency (VHF)-based, short-range communication system that provides a means for vessels to electronically exchange data, including identification, position, course, and speed, with other nearby vessels and shore-based AIS receivers. Depending on signal strength, weather, geography, and receiver capability, AIS signals can generally be received up to 50 miles away.

Under amendments to the International Convention for the Safety of Life at Sea (SOLAS) adopted in December 2002, vessels over 300 gross tons are required to carry AIS. Section 70114 of title 46, United States Code, requires certain commercial vessels operating in U.S. waters to carry AIS. In October 2003, the Coast Guard issued a final rule (33 C.F.R. section 164.46) requiring AIS on commercial vessels greater than 300 gross tons, passenger vessels larger than 150 gross tons, towing vessels over 26 feet, and all other vessels over 65 feet with a few exceptions.

Nationwide Automatic Identification System

The Coast Guard collects AIS signal data through its Nationwide Automatic Identification System (NAIS). NAIS consists of approximately 200 VHF receiver sites located along the coasts and inland river systems of the United States. NAIS allows the Coast Guard to collect data from AIS-equipped vessels traveling in the vicinity of the Nation's 58 largest ports.

Long Range Identification and Tracking

Long Range Identification and Tracking (LRIT) is a worldwide, satellite-based automated tracking system for vessels subject to SOLAS regulation (vessels on international voyages with 12 or more passengers, or over 300 gross tons). Section 70115 of title 46, United States Code, required the Coast Guard to establish a long range tracking system. Amendments to SOLAS were adopted in May 2006 to require all SOLAS-regulated vessels to carry LRIT. The system became operational on December 31, 2008.

Unlike AIS, LRIT is a secure system in which vessel identity and position data is transmitted every six hours to data centers that distribute them to countries permitted to have the information. This system allows SOLAS Contracting Governments, such as the United States., access to flag, port, and coastal state LRIT information as necessary.

Notice of Arrival and Departure

Section 4(a)(5) of the Ports and Waterways Safety Act of 1972 (33 U.S.C. 1223) authorizes the Coast Guard to require vessels bound for U.S. ports to file notices of arrival before arriving. Prior to the terrorist attacks of September 11, 2001, vessels over 300 gross tons submitted notices of arrival directly to Coast Guard officials at the port of arrival 24 hours before arriving at port. On October 4, 2001, the Coast Guard issued a temporary final rule (33 C.F.R. Part 160) to increase the submission time to 96 hours; expand the notice of arrival to include

passenger, crew, and cargo manifest information; and require all data to be sent to a centralized Coast Guard data center.

Rescue 21

Rescue 21 is the Coast Guard's advanced distress call monitoring and response system built to replace the obsolete National Distress Response System. Rescue 21 provides direction finding capability for VHF distress calls, interoperability with first responders, and Digital Selective Calling (DSC). Rescue 21 is operational along the entire shoreline of the continental United States, as well as along the shores of the Great Lakes, Hawaii, Puerto Rico, the U.S. Virgin Islands, Guam, and the Northern Marianas Islands. Due to geographic and cost related issues, the Coast Guard no longer intends to install the Rescue 21 system in Alaska or along the Mississippi and Missouri River systems. Instead, both areas will receive upgrades to the legacy NDRS system that will improve reliability and provide DSC capability.

Other Collection Sources

The Coast Guard also collects and shares information on the maritime domain through its day-to-day operations, intelligence programs, open source information, and agreements with other federal agencies, state and local governments, and the private sector. For instance, the Coast Guard has an agreement with the National Oceanic and Atmospheric Administration (NOAA) to receive Vessel Monitoring System (VMS) data from certain commercial fishing vessels. VMS provides the position and identification of certain commercial fishing vessels through a satellite-based system the Coast Guard uses for fisheries enforcement activities and to respond to search and rescue cases. Also, new real-time integrated ocean observation and monitoring data concerning the physical ocean environment made available through the National Integrated Coastal and Ocean Observation System has been used to enhance the efficiency of Coast Guard search and rescue activities.

Fusion, Analysis, and Dissemination

Once MDA information is collected, it must be fused together and analyzed before being disseminated to decision makers for potential action. The Coast Guard uses the following programs and infrastructure to accomplish these tasks:

Common Operating Picture

A Common Operating Picture (COP) is a map-based information system that fuses together and displays MDA data collected through various sources. The Coast Guard operates several COPs that selectively display information concerning vessels, the threats they may pose, and the environment surrounding them on interactive digital maps. COP information is shared via computer networks throughout the Coast Guard to assist operational commanders with tactical decisions to deploy assets.

Intelligence Coordination Center

The Coast Guard Intelligence Coordination Center (ICC) coordinates and integrates the collection, analysis, production, and dissemination of Coast Guard intelligence. The ICC provides intelligence to Coast Guard leadership, as well as to other military and intelligence services, and civilian agencies. The ICC is collocated with the Navy and Marine Corps intelligence units at the National Maritime Intelligence Center in Suitland, Maryland.

Issues

Gaps in Collection

Most small commercial vessels are not currently required to carry AIS. This leaves the Coast Guard with little real-time information on their activities in the maritime domain. On December 16, 2008, the Coast Guard published a Notice of Proposed Rulemaking (NPRM) (RIN 1625-AA99) to amend the current AIS regulations to expand AIS carriage requirements to fishing vessels over 64 feet, passenger vessels carrying over 49 passengers, and vessels carrying certain dangerous cargo. The Coast Guard estimates the 10-year total cost of the proposed rule on vessel owners is between \$181 million and \$236 million, while the benefits in the form of reduced property damage could also total \$236 million. The NPRM would more than double the number of vessels currently tracked by the Service. A final rule is still under development by the Coast Guard.

As part of its MDA activities, the Coast Guard tracks the location of most of its vessels and a few of its aircraft. This “blue-force tracking” capability improves the Service’s situational awareness and enables it to more efficiently deploy and operate assets. Unfortunately, the Service has not yet developed a way to track all of its surface and air assets, nor integrate information regarding an asset’s operational status.

Gaps in Fusion, Analysis, and Dissemination

The Coast Guard currently operates several COP systems available to users depending on the mission. For instance, the Service uses its Search and Rescue Optimal Planning System (SAROPS) to plan and execute search and rescue missions. It also operates several COP systems that display information on vessels and the threats they may pose. Operational commanders can use the Global Command and Control System to fuse, filter, and display information and intelligence on vessels in the maritime domain. Finally, the Service operates COP systems that enhance information available through its other COPs. For instance, operational commanders can use the Command and Control Personal Computer System to enhance the data available through SAROPS by overlaying information from AIS and other sources.

The GAO has reported that these disparate COP systems sometime do not function or integrate properly and consume so much computing capacity that command center computers often crash. The GAO also noted that Coast Guard personnel are not always properly trained on how to use the systems (GAO-13-321). To address the situation, the Coast Guard is developing a new COP system, Coast Guard One View (CG1V), to provide users with a single interface for all

COP functions. The Service expects to deploy CG1V in fiscal year 2014. However, the GAO recently faulted the Coast Guard for not following proper procedures for the development of the technology (GAO-13-321).

Section 70107A of title 46, United States Code, required the Department of Homeland Security to establish Interagency Operations Centers (IOCs) in high priority ports by October 2009. IOCs were intended to bring together federal, state, and local authorities into a single command center at each of the Nation's high priority ports. IOCs were intended to improve coordination of activities, reduce operating costs, and enhance information and intelligence sharing. However, budget constraints have left many IOC partner agencies unable to provide dedicated staffing. In response, and to avoid construction costs for "bricks and mortar" facilities, the Coast Guard developed "virtual IOCs" as a way to conduct information sharing.

To facilitate the "virtual IOC" concept, the Coast Guard spent \$74 million to develop a software program called WatchKeeper. WatchKeeper was designed to gather data from sensors and port partner sources to provide comparable situational awareness among Coast Guard field personnel and IOC partner agencies. To date, the Coast Guard has activated the Watchkeeper software at 26 Coast Guard sectors. It expects to deploy Watchkeeper at the nine remaining sectors by 2014.

In February 2012, the GAO reported that WatchKeeper failed to meet port partners' needs and was being underutilized (GAO-12-202). GAO found that of the 233 port partners who had access to WatchKeeper, only 18 percent had ever logged onto the system and about 3 percent had logged on more than 5 times. The GAO faulted the Coast Guard for failing to follow established guidance to determine the needs of the system's users, define acquisition requirements, and manage the system's cost and schedule.

Command, Control, Communication, Computers, Intelligence, Surveillance and Reconnaissance

As part of the Coast Guard's ongoing 25 year, \$29 billion recapitalization of its legacy fleet of cutters and aircraft, the Service is also upgrading the Command, Control, Communication, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) systems on these assets and at shore-based installations. The C4ISR program is comprised of a core software and hardware suite for each Coast Guard asset that integrates sensors, communications systems, and intelligence information into a COP. The program's goal is to deliver a C4ISR-equipped asset that can collect and process MDA information from a variety of inputs and integrate it onto a user-defined COP.

In July 2011, the GAO reported that not all recapitalized vessels and aircraft carried the same C4ISR system or operated at the same classification level, meaning the assets could not access all forms of data directly or share data with one another (GAO-11-743). The GAO also reported that the Service was shifting from full data-sharing capabilities to a system where each asset sent data to a shore-based command center for integration into a COP.

The President requests \$35.2 million for C4ISR in fiscal year 2014, \$3.3 million (or 9 percent) less than the fiscal year 2013 enacted level. The Coast Guard has budgeted \$235 million

for C4ISR over the next five fiscal years in its Capital Improvement Plan. At this level of funding, the Service expects to be able to continue to deploy and maintain its current C4ISR systems on recapitalized air and surface assets, but not to develop and deploy new C4ISR systems to stay ahead of technological obsolescence.

WITNESSES

Panel I

Rear Admiral Mark E. Butt
Assistant Commandant for Capability
United States Coast Guard

Mr. Stephen Caldwell
Director, Homeland Security and Justice
United States Government Accountability Office

Panel II

Mr. Steve Morrow
President & CEO, Insitu
on behalf of the
Association for Unmanned Vehicle Systems International

Mr. Bill Vass
President & CEO
Liquid Robotics, Inc.

Ms. Lisa Hazard
Operations Manager, Coastal Observing Research and Development Center
Scripps Institute of Oceanography

Dr. Newell Garfield, III
Director, Romberg Tiburon Center
San Francisco State University

**HOW TO IMPROVE THE EFFICIENCY, SAFETY,
AND SECURITY OF MARITIME
TRANSPORTATION: BETTER USE AND
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WEDNESDAY, JULY 31, 2013

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON COAST GUARD AND MARITIME
TRANSPORTATION,
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE,
Washington, DC.

The subcommittee met, pursuant to notice, at 10:30 a.m. in Room 2167, Rayburn House Office Building, Hon. Duncan Hunter (Chairman of the subcommittee) presiding.

Mr. HUNTER. The subcommittee will come to order. All right. There are no Democrats here, but we've been advised. If that's OK, we can start anyway. Excuse me for not wearing a tie. I had some neck surgery, and I'm trying to keep the incision open so it can fix itself.

The subcommittee is meeting this morning to review the status of Coast Guard maritime domain awareness programs. The Coast Guard operates a broad array of systems and sensors to gather data to enhance the Service's awareness of activities in the maritime domain. At a time when budgets are being cut and the Coast Guard is being stretched thin, maritime domain awareness, MDA, provides critical information to more efficiently deploy personnel and assets.

Although the Service has made progress over the last decade in acquiring new technology to collect, integrate, and disseminate MDA data, implementation has been slow, several gaps still exist, and budget realities mean the Coast Guard will struggle to achieve its goals for the MDA program.

The Coast Guard currently attracts large commercial vessels and other potential threats in the maritime domain, but the Service still lacks a single system of—capable of fully fusing, filtering, and displaying all MDA information in common operating picture.

The concept of the common operating picture was also at the center of the Coast Guard's effort to recapitalize its aging and failing legacy assets. The goal was to acquire new C4ISR technology that would enable—recapitalize vessels and aircraft to collect and fuse MDA information into a common operational picture, and then share with one another and among shore-side installations.

The Coast Guard has made progress towards that goal but has yet to fully achieve it. The GAO recently reported that many recapitalized assets could not fully share data because they operate different C4ISR systems at different classification levels.

Complicating the Coast Guard's efforts to improve MDA is the current budget environment. Budget constraints have forced the Coast Guard to drop plans to install upgrades to C4ISR systems on its aircraft and vessels in the future. Given this development, I am interested in hearing how the Service plans to ensure new assets acquired over the next 20 years will achieve their full capabilities and not suffer from obsolete technology.

I encourage the Coast Guard to review its MDA and C4ISR programs to improve ways to deliver these capabilities more efficiently. Our second panel of witnesses comprises a cross-section of MDA stakeholders and private industry and academia. I look forward to their testimony on new technologies that could improve the Coast Guard's MDA efforts in a cost-effective manner.

Maritime domain awareness is a critical tool to maximize the Coast Guard's capabilities, to safeguard American interests in U.S. waters and on the high seas. If effectively implemented, MDA can improve the efficiency, safety, and security of maritime transportation.

I am anxious to hear from the witness on what they think the future holds for the MDA programs and how we can best move forward to make sure the Coast Guard achieves the goals it has for the MDA—for MDA.

With that, I yield to the ranking member, who is not here, so I will recognize Mr. Garamendi for an opening statement when he arrives.

Our first panel of witnesses today are Rear Admiral Mark Butt, Assistant Commandant for Capability of the United States Coast Guard and Mr. Stephen Caldwell, director of Homeland Security and Justice Issues at the United States Government Accountability Office.

Admiral Butt, you are recognized for your statement, and thank you both for being here. I apologize for not having more of my side and the other side here, but that's OK. The people that are important are sitting to my sides here, so they're here.

TESTIMONY OF REAR ADMIRAL MARK E. BUTT, ASSISTANT COMMANDANT FOR CAPABILITY, UNITED STATES COAST GUARD; AND STEPHEN L. CALDWELL, DIRECTOR, HOMELAND SECURITY AND JUSTICE ISSUES, UNITED STATES GOVERNMENT ACCOUNTABILITY OFFICE

Admiral BUTT. Good morning, Chairman Hunter. Thank you for the opportunity to testify today and for your continued advocacy, interest, and oversight—yes, sir.

Is that better? OK.

And for your continued advocacy, interest, and oversight of the Coast Guard's command and control systems. As Assistant Commandant for Capability, my primary responsibility is to identify and provide Coast Guard capability and capacity to meet mission requirements. This includes the very important ability to discover, correlate, and distribute maritime threat data and operational re-

source availability to and from the operational assets of both the Coast Guard and other Government agencies. I have a brief opening statement and would like to submit my written testimony for the record.

Whether responding to a distress call, interdicting an enlisted vessel, or investigating a maritime infrastructure threat, accurate and timely information gathering and sharing across agency domains is critical for operational effectiveness. The dynamic and demanding operating environment in the maritime domain requires that our capabilities be interoperable and flexible in order to deliver the right capability to the operational commanders at the right time.

The Coast Guard has adopted a strategy that identifies and fields C4ISR capabilities specific to the asset's environment and operational needs. We are leveraging advanced technologies and working closely with our Department of Homeland Security and the Department of Defense partners to field C4ISR solutions that fit, are sustainable, and provide us with effective C4ISR. Allow me to highlight a few of these.

The simple component of our effective C4ISR is searchable and discoverable data managed, moved, and formatted within the common operating picture. This provides operational commanders and senior decisionmakers with mission critical information necessary to identify threats and coordinate operations.

The Coast Guard common operating picture allows data exchanges and system interoperability among shore, surface, and aviation assets as well as with external partners. It integrates automatic data feeds from nationwide automatic identification system, the long-range identification and tracking systems, additionally, integration of data from customs and border protection, Department of Defense, and other State and local agencies. C4ISR systems improves situational awareness and collaboration across the services.

At our shore command centers, the WatchKeeper System allows for vessel track viewing and is accessible by Federal, State, and local partners allowing for coordinated response to port security threats and search and rescue cases. Airborne HC-144 aircraft with Mission System Pallets and HC-130J aircraft equipped with the Mission System suite are capable of real-time upload of the common operating picture track data and downlink of sensor data on tracks of interests to operational commanders.

Aboard the Fast Response Cutters, SeaWatch displays common operating picture data allowing commanding officers to view vessel tracks and associated intelligence allowing for interdiction prioritization. These capability reflect the Coast Guard's path to put the right information at the right place at the time for our frontline personnel to make decisions that impact maritime safety and security.

As the Coast Guard looks to the future, we recognize the challenges and opportunities ahead and are focused on continuing efforts to improve collaboration and interoperability. Our effort with CG1 View does this. CG1 View provides operators with a customizable desktop interfaces which allows a user to view various sensor and system inputs, such as Search and Rescue Optimal

Planning System and Rescue 21 inputs for search and rescue, customs and border protection source passenger and cargo screening data for security operations, and Blue Force tracking data for coordinated, multi-unit, multi-agency interdiction operations.

In addition to improved situational and maritime domain awareness, the Coast Guard is expanding its network-based connectivity capable to improve direct unit-to-unit communications as well as the timely exchange of information and C4ISR data. This approach, among a number of other ongoing efforts is the Coast Guard's path to a continuing effort to place the right information at the right place at the right time for the right people to make decisions that impact maritime safety and security.

Thank you again for this opportunity to testify. I look forward to answering your questions.

Mr. HUNTER. Thank you, Admiral.

Mr. Caldwell, you are now recognized. You're probably in high demand, director of Homeland Security and Justice for the GAO. There's not much going on there these days.

Mr. CALDWELL. Thank you very much, Mr. Chairman. We appreciate that. We've got some other directors, but it's a busy time, and in fact, I'm testifying before Mr. Meehan's committee on the Homeland Security Committee tomorrow.

Anyway, thank you, Chairman Hunter and also Mr. Meehan, for being here and inviting GAO to testify. We're going to be talking about our the Coast Guard's efforts to develop a common operating picture, which is one of the important components of maritime domain awareness. In general, the COP, just to put it in simple terms, is a graphic display of information from a number of sources. It's customized by a wide variety of different Coast Guard users for different purposes and functions, to execute the Coast Guard's missions.

My statement today is going to focus on four different systems that contribute to the COP. The first of these is the C4ISR project. This is one of the biggest ones, within the larger Deepwater recapitalization program. This C4ISR program was designed, among other things, to make vessels and aircraft both producers and consumers of the COP.

The WatchKeeper project is the second one. This is within the larger interagency operations center program, and this was to gather maritime domain awareness information and to share it among not just Coast Guard and other Federal agencies, but among State and local authorities within key ports.

The third system we looked at was the Enterprise Geographic Information System or EGIS, and this is a COP viewer that the Coast Guard started deploying in about 2009, used mainly by on-shore units to customize the COP for mission planning and execution.

And then finally we looked at "Coast Guard One View" in the earlier part being rolled out. This is the Coast Guard's newest COP viewer that was just mentioned by Admiral Butt.

So overall, in terms of looking at these four systems and some of the things they've delivered, there certainly has been a lot of progress through these systems and others in improving the COP within the Coast Guard. They certainly have added more useful

data in terms of additional sources, things like vessel locations and Blue Force tracking, which is the ability to track our Coast Guard and other friendly boats.

Also they've increased the COP capability by improving the satellite communications infrastructure. They've expanded the number of COP users by putting them out on more workstations out there, so it could be used at most desktops within the Coast Guard, both headquarters and in the field.

However, for all four of the systems we looked at, a common problem that we found related to weaknesses in acquisition management. In general, the Coast Guard wasn't following its acquisition plans or guidance in several different ways. Some problems were more significant than others. But these led to problems such as an acquisition strategy for C4ISR that was repeatedly changed, so a lot of the vessels and aircraft that were, at one point, going to have the same system having different systems, which limits information sharing and increases the time to pass data across some of these assets.

Another problem was that requirements of non-Coast Guard users were not solicited when the interagency operational centers were being developed. This has led to the WatchKeeper system, which is one of the key COP systems there, not being used by the other maritime stakeholders it was intended for, so the information sharing in those centers has not been realized.

Also, another problem was the implementation of EGIS that was slow and inaccurate. Because of the computer systems it was put on, it degraded or it even crashed other computer systems that were in use.

And then finally with EGIS, some of the documentation for managing that acquisition were not prepared in the proper order. Variations were made from established policy. If those were made and fully documented, we would have been fine with those, but they weren't. So some of the alternative systems were not examined, and the costs are still largely unknown, at least when we looked at this system last year.

So overall, these problems have led to a COP that's less comprehensive, less integrated, and less timely than what we would have expected looking at the earlier planning documents. In summary, those high-level plans and requirements that were developed between 2004, 2005 would have led to a COP that was seamless across the locations and platforms. While we're making advances, the COP has not realized its full potential at this time. Thank you very much. Be happy to answer any questions.

Mr. HUNTER. Thank you both. I just have kind of an opening gambit here. I've had a chance to sit on the Armed Services Committee. I've had a chance to do time overseas, and what you see is the different services having problems when they try to get C4ISR, and they try to do their own common operating picture, and they have Blue Force Tracker, and they combine other stuff, and you do the intel fusion, and you want to be able to see your UAVs and your good guys and your bad guys and be able to click here and see what grid square holds which guys, and it seems like the better technology gets.

And the cheaper it gets, the more robust it gets, the harder it gets for our services to be able to get one or two contractors together, be they defense contractors or otherwise, and form a picture that any corporation has day in and day out. UPS, for instance, tracks thousands of trucks and vans, airplanes, products, tracks the weather, does everything that they need to do for a global corporation. But when it comes to things like making sure that we can see what parts of the oceans have oil in them or what parts of the ocean have bad things happen, we're unable to do it.

We spend a lot of money, we come up short every time, but the lucky part for you is you just started. You haven't wasted billions of dollars yet like the Army and some other services have on doing things that don't work yet. OK? So basically what we want to get into is we just want to make sure that you get it right from the start, because it shouldn't be that hard to do.

It may be that hard to do within the confines of Government contracting, but my advice would be just to work through it and do what any corporation in your shoes would have to do and get something that is cost effective and relevant and able to be upgraded over time so that it never gets old. It's open source, you can plug stuff into it, and it's secure.

But those things aren't that hard. Those sound hard, but they might have been in 2003, but they're not in 2013. So the question is this: In 2011, this is—a few other questions, but here's the starting one here, Admiral. In 2011, GAO found that after Coast Guard abandoned its goal of building a single, fully interoperable C4ISR system—in case anybody doesn't know, that's command, control, computers, communication. So those are your C4, then intelligence, surveillance, and reconnaissance is the ISR part. C4ISR strategy—in all vessels and aircraft, we're using the same C4ISR system.

So have you decided on a system to be used by the entire Coast Guard?

Admiral BUTT. Thank you, sir. In 2004—and you look at the documentation—the Coast Guard was going down the same path as the other services. What we're going now on is exactly looking at that open architecture type support that industry uses to set up, because not only do we have to meet with the DOD services, we have to meet with Federal, local, and State partners. So we have both the class and the unclass COPS that we have to worry about and communicate so that the—

Mr. HUNTER. I'm going to interrupt if you don't mind. So are you saying that it's up the Coast Guard then to make sure that they match whatever every single State chooses to use for their local policing forces? So you have to have software that then opens up to every single coastal State or city or municipality, organization?

Admiral BUTT. Sir, in the port environment, for us to be able to work with all those partners, somebody is going to have to do that. And so the way we're setting up the WatchKeeper program is part of it is to be—driving towards that open architecture to be able to take disparate inputs and then correlate both the track data, sensor data, as well as various databases and be able to put it in a format where the Coast Guard watch standard and the IOC is then able to use that information in the—

Mr. HUNTER. All right. That will never work. There's no way you can have a software that interacts with every single agency, organization, or municipality that may or may not exist among the coastlines to make sure that you don't miss anybody.

Admiral BUTT. Well, industry, sir, is coming out with standards. They're standards to set to, so that's what we're building the architecture to.

Mr. HUNTER. What standards? And when you say industry, which part of the—because I'm in industry, and I know standards.

Admiral BUTT. It's the Ozone Widget Framework, sir.

Mr. HUNTER. Say it again.

Admiral BUTT. Ozone Widget Framework.

Mr. HUNTER. Ozone Widget Framework.

Admiral BUTT. Widget Framework.

Mr. HUNTER. OK.

Admiral BUTT. Is the standards for it, so as long as the other partners are going towards that standard, then it would work.

Mr. HUNTER. Who are the other partners?

Admiral BUTT. Whether it be State, whether it be Federal partners, which we're working with S&T on to make sure that the DHS work in that direction or it would be local partners getting grants.

Mr. HUNTER. OK. So DHS will require anybody that gets Federal money to comply, theoretically, with Ozone Widget open architecture?

Admiral BUTT. That's the assumption we're working under, sir.

Mr. HUNTER. And that's all going to fit into WatchKeeper?

Admiral BUTT. That is the direction we're moving, sir.

Mr. HUNTER. OK. So you have decided? So you've decided on a technology and an architecture now going forward?

Admiral BUTT. That is the direction we're working, yes, sir.

Mr. HUNTER. Do all of the vessels and aircraft—are they going to get this system onboard?

Admiral BUTT. They won't get WatchKeeper. They will—what we're—

Mr. HUNTER. Not the WatchKeeper system, but they'll have a sensor suite to interact—

Admiral BUTT. The plan is to move—yes, sir. Every one of the major cutters, the patrol boats, and our aircraft to have in the COP available.

Mr. HUNTER. So how many would you say have it now?

Admiral BUTT. The HC-144s with the missionization pallet would have it and the C-130Js have it.

Mr. HUNTER. So if you gave me numbers, 5 out of 50 airplanes and vessels or what would you say?

Admiral BUTT. Eighteen of the medium range planes, 18 of 18, and then C-130s, we've got 8 or 9 out of 22.

Mr. HUNTER. And then vessels?

Admiral BUTT. The vessels—the FRCs that are coming online all have it. Some of the legacy vessels have been transitioned to SeaWatch, and I'll have to get that for the record.

[The information follows:]

As of 01 August 2013, the following legacy Coast Guard vessels have SeaWatch installed:

- Six 378-foot: *Sherman, Mellon, Midgett, Morgenthau, Munro, Boutwell*
- One 270-foot: *Legare*

Mr. HUNTER. FRCs come out of Bollinger with this in them?

Admiral BUTT. Yes, sir.

Mr. HUNTER. Gotcha. So they actually install this at the shipyard?

Admiral BUTT. Yes, sir. It's part of the FRC architecture.

Mr. HUNTER. Gotcha. OK.

Mr. Garamendi has arrived. I will yield to him for 5 minutes.

Mr. GARAMENDI. Mr. Chairman, thank you for starting the meeting. As I think you know and perhaps the audience does not, the Democratic Caucus just concluded a meeting with the President, and it's not good to walk out on the President.

But it's not good to delay getting here, but among the choices, Admiral and Mr. Caldwell, my apologies for not being here early on.

Mr. Chairman, there's a statement I'd like to submit to the record from the International Longshore and Warehouse Union. Without unanimous consent, I will take it up when he gets back.

My own statement, I won't read it, but I'll ask consent to get that in the record also for the record.

I'm trying desperately to catch up here with the questions of—there are some questions that my very capable staff has prepared, and I'll go with those. If they've been asked and answered, then let's not proceed with those.

This one deviates—the Coast Guard deviation from internal acquisition guidance. I think, Mr. Caldwell, you've raised this issue. The GAO has criticized the Coast Guard from—for common—deviating from his own internal acquisition guidance for the development of the program requirements for the new C4ISR assets to improve its MDA capabilities.

Admiral, do you agree with the critique that has been given by the GAO?

Admiral BUTT. Sir, in general, I agree with it. The criticism on the documents and the sequencing, there are definitely reasons as we're trying to push forward that would allow documents to go out of sequence, and I'm not so sure that the process actually calls for that, but in general, I agree with the critique.

Mr. GARAMENDI. And that—how about the software systems? Are they moving forward appropriately?

Admiral BUTT. The software systems—

Mr. GARAMENDI. Coast Guard One View software.

Admiral BUTT. Yes, sir. Coast Guard One View we're moving forward with, and we're getting the documentation in place. The current plan would be to start fielding it at the end of 2014.

Mr. GARAMENDI. Next question that was developed was the viability of the systems—system of systems concept. The former Deepwater acquisition program was sold to Congress on the idea that it would be—would provide the Coast Guard with a new system of systems capability, that this new capability would allow greatly enhanced ability of the Coast Guard to communicate and function. I

think this may have been a question that was just taken up by the Chair.

If not, my question then is: Admiral, what is the official position of the Coast Guard with respect to the system of systems concept? Apparently, that was not asked.

Admiral BUTT. Sir, the system of systems concept we're still going forward with, but over the last 10 years, the technology has changed, so the architecture of that system of systems is evolving. So our goal is to come up with an open architecture system that's going to be able to be moved forward to the future where we can do technology upgrades to it and not be tied to any one vendor so that we can take different inputs both from databases as well as sensors and be able—give that to the decisionmaker.

Mr. GARAMENDI. This has been put off to be worked on in the future. Given the budgets that seem to be present in the foreseeable future, what effect would this have on the domain awareness—maritime domain awareness?

Admiral BUTT. Well, right now, the systems we're putting in place have been continuing to improve our maritime domain awareness, and for an example I can give you, my daughter is a watch scanner down at Sector New Orleans, and she was there during Deepwater Horizon, and she's still down there when we had that oil well that—or that gas well that we had the problems with last week.

So in discussing, there's a night and day difference of sector New Orleans MDA capability for those watch standards between this last week event which is very akin to Deepwater Horizon, although it wasn't near as catastrophic. So what feedback we're getting is it's improving, and we're going to continue to keep improving it. The advantage of going to open architecture and following the industry standards is I think we can do it much, much cheaper than what the original estimates were.

Mr. GARAMENDI. Mr. Caldwell, what's your view of all of this?

Mr. CALDWELL. Well, with the C4ISR, it's a very large problem. Part of it is the management of the acquisition, and part of it is just keeping up with the speed of technology. That program—if you look at the baseline for when it was created—shows the costs have gone up 86 percent from the baseline, and completion slipped from 2014 to 2027 in the revised baseline.

There's issues managing that acquisition, but the bigger challenge to talk about at the higher level, it's keeping up with the speed of technology, at the same time complying with the acquisition regs, which is not an easy thing to do. Obviously it's even more difficult doing within the constraints of the current budget environment which is lower than it has been traditionally.

Mr. GARAMENDI. So they'll need flexibility? Is that what I heard you say?

Mr. CALDWELL. They will, and in terms of the Coast Guard One View, which is the newest viewer we looked at, we wouldn't have had an issue if the Coast Guard upfront had said, "We're going to deviate from certain parts of the acquisition process for these reasons." But those justifications weren't developed and documented until more than a year after the program decisions had already been made.

Mr. GARAMENDI. OK. I'll yield back, and then when our colleague finishes, I'll come back for another round of questions.

Mr. HUNTER. Mr. Meehan is recognized.

Mr. MEEHAN. Thank you, Mr. Chairman, and let me thank you, Admiral, for your service to our country and in uniform and those of your colleagues who are here, and I appreciate the tremendous challenges that are faced in securing our homeland, particularly on its borders.

One of the areas that frustrates me frequently, though, in my capacity in homeland security as well is the myriad efforts that we have to sort of integrate State and local and our partners in a way that effectively works, not only that we integrate them so that they effectively communicate among each other, but that we're actually funding missions in which there's desired information that's being put to use.

We're having great frustration in dealing with this whole concept of fusion centers in which we are supposed to be collocating Federal, State, and local assets, and they're supposed to be discussing things among each other, but it's a hard time getting a commonality of agreement about what the real purpose is, what the mission is.

And yet we go back, unfortunately—I participated in the hearings on homeland in which we dissected the failure to communicate about certain bits of information, which caused many people to believe that some of the issues in Boston recently may have been able to have been maybe addressed perhaps if we had better communication.

So I'm really asking you just about the WatchKeeper program. Now my own port of Philadelphia—when I was the U.S. attorney, we had a great relationship with the Coast Guard, they were there, they were partners in a variety of different things, but I don't know how you're operating today with the fusion center, which if I'm correct is probably just a few blocks away if you know about what's going on in Philadelphia. What's your experience overall with the ability of State and locals to become partners with your WatchKeeper program and it isn't giving them information that people are finding necessary and relevant to their missions?

Admiral BUTT. Sir, it's a great question, and Philadelphia and the whole sector, Delaware Bay layout is very interesting, because you have the tri-State region, so it's probably one of our hardest AORs to actually go and try to figure out the fusion.

What WatchKeeper has done for us, again, is to put the backbone in place so that we can pull sources from sensors and from databases to be able to provide the users. So that's—the baseline WatchKeeper is in place and starting to do that. Now the front end of that, to give the users the ability to be able to use that information, is what we're working on with CG1 View, because the viewer for WatchKeeper, as it was delivered, as my daughter puts it, is clunky. So this was—gives us the ability to actually gets toward that information better.

Now the other—

Mr. MEEHAN. What is it that you're trying to bring, though, to the attention of, say, a local fusion center? That's what I'm looking

at. We know—is it the nature of the type of cargo that’s coming up the port or——

Admiral BUTT. It can be that. It’s basically anomaly detection is what you’re looking for. Do you have boats that are in places they shouldn’t be? Do you have cargoes or passenger manifests or people coming in that it doesn’t make sense and being able to then get that information, raise those flags, and get that information to the decisionmakers that can do something about it. That’s really the circle that we’re talking about here.

Mr. MEEHAN. But what it seemed to me—I mean we’re talking about, as you stated, the tri-State region in which you’re—you could spend as much time sending that information, trying to have somebody figure out what it means as it would be you would be you would scramble your own asset out there to do a visual inspection and look at it if you saw an anomaly, right?

Admiral BUTT. And that would definitely be one of the tools the operational commander could use depending on the anomaly, yes, sir. So what we’re trying to do is to get that so we can fuse it. Now with WatchKeeper, we put the baseline capability out. Now I need to back, and we need to talk to our partners across the board, capture their needs, and be able to get it so we can get that data fused.

We have a program up in Seattle right now that we’re working with DHS S&T on through the university programs and the Port of Seattle to do just that, is to find the other partners’ needs up in the Seattle area and expand it out. The other thing we’ve put into place Coast Guard-wise is using a COPs tool—is the ability to capture that information and prioritize it.

We didn’t have that business process in place till recently. So now I have a mechanism for going out through DHS S&T to start capturing our port partner needs, and we have a tool for tracking and prioritizing the incorporation of those needs——

Mr. MEEHAN. In other words, you would work with the other participants in the activity of that port to ask what it is that they would be looking for in the form of specific information?

Admiral BUTT. Specific information or from the databases or sensor information from the cameras and radars, yes, sir.

Mr. MEEHAN. OK. Well, I’m—maybe Mr. Caldwell—my time is up, but you’ve looked at this issue from GAO, and it points to—I mean I don’t think it’s a lack of effort on the part of the Coast Guard. I think it’s a lack of the ability for some kind of fusion to take place in which information is being developed that pertinent and relevant to what the State and locals are supposed to be generating, and we’re—it’s as much a problem on the State and local side. I’m looking for them to define what we’re trying to accomplish. In the end, what is it that we are doing? Can you tell me what you found by your review with the GAO in this issue?

Mr. CALDWELL. Yes. In the port environment, the fusion centers are generally called interagency operation centers, and there’s some very impressive ones out there made of brick and mortar. The money ran out, so they went to a more virtual model. But if you went to one of the earlier, more successful ones like SeaHawk in Charleston, it was relatively expensive to build and operate.

There was a lot of money put into it as a prototype, and those funds actually included some operating costs to get State and locals in there 24/7. You had a very healthy kind of 24/7 environment. Moving forward, we're no longer funding State and locals to actually participate in these things in terms of those salaries, so you get a little bit of a drop in—

Mr. MEEHAN. They dropped off? Did you see a big drop-off from State and locals?

Mr. CALDWELL. We didn't track that in actual numbers, but just as a general trend, I think we are seeing less involvement. We were just in San Diego, for example, about a month ago doing some of our audit work on the small vessel threat.

And one of the issues there is that State and locals are not there as often as they used to be. They do have enough room in that interagency operating center that they can ramp up and they can surge and they can add places for other Federal agencies like the Navy or FBI or the Port of San Diego Harbor Police to come in there. We did still find there was a healthy relationship out there, but in terms of the actual using the WatchKeeper software to share information, we did not find that.

The good news about WatchKeeper is it will standardize some of the command and control systems throughout the Coast Guard sectors, because the plan is to get it out to all 35 Coast Guard sectors. The jury is still out on whether there will ever be the interagency Federal, State, local that they were intended to be. There were 233 port partners who had access to the WatchKeeper system; 192 of those had never even logged onto the system—

Mr. MEEHAN. And that goes into the point that I was making earlier about we're generating information, but it isn't relevant to—and in a time in which we're already sort of collocating facilities, the cost associated to the placement of those is a precious item, and that's why I used the example. And Admiral, I would appreciate it if you would just look into how the fusion center and your Philadelphia-based efforts are collaborating.

I mean one—the idea of getting people from these assets to collocate in your facility when right down the street you have a fusion center which may or may not be getting the full complement of State and locals that they need, seems to me that this is the problem that we have, and I don't blame the Coast Guard; I blame the totality.

There's always a competition that's taking place among data systems that say, OK, we've got this great data, use our system, and people aren't trading information. And most of the time, it's not an issue, and we may have that one occasion where somebody looks back and says, hey, this information was contained in the data system, and had it been appropriately communicated, it could have sent a signal to us that we should have looked into something, and it's only in the aftermath of an incident like Boston that those things make sense.

So I know there's value, and I appreciate your efforts, but I think this is an issue we've got to continue to look at. Thank you.

Thank you, Mr. Chairman. I yield back.

Mr. HUNTER. Thank the gentleman.

I've got a question. I was out in Palo Alto a few months ago, and I saw—in fact, our next panel has some folks from Liquid Robotics, and they have these surfboards that—they're in the ocean, they have sensors on them, and we stood there, and I almost got to meet the guy that invented Java which was pretty interesting for a computer science guy. The guy that literally invented the programming language called Java was at—works there.

So he was there. He was gone by the time we got done with our little tour, but you can look up at the flat-screen TVs and you can see and monitor every single one of their floating vehicles. You can see them all, literally, at any given time on the screen floating around the world. So this—and these aren't expensive. It's not crazy to do. In fact, they're extremely inexpensive. They can test the water, they have cameras on them, they can look at the water, they can see sheen—an oil sheen or any other kind of spill on the water.

They can test the water, they can test weather, they can do a lot of different things, and it takes no people whatsoever to do those. And you can literally have a thousand of them on the ocean at a time or 10,000, however many you may think that you need. My question is this: If you were a big corporation and your job was to take care of the oceans and to take care of the American waters and you had shareholders, what kind of software system would you get to do this? Who would you get?

You might not go to—and Mr. Caldwell, I'd like to ask you first. You wouldn't necessarily go to a number of great contractors who I will not mention here that a lot of folks around here use and are great people. But as a corporation you might go to people in industry and get maybe a different look at this and a different product. So my question is then: If you were in real life and not Government with an infinite supply of money and you could go over deadline over and over, and over budget over and over and over, but if you were in real life, what would you do here?

Mr. CALDWELL. I'm not one of our IT experts within GAO, but you're going to need an open architecture so that as things change, they can work new systems in and out of it, Web-based, cloud-based. But then obviously you've got to ensure a secure site if you are doing law enforcement and military missions.

Mr. HUNTER. Admiral.

Admiral BUTT. Sir, specifically when you're talking autonomous surface and underwater vehicles, my major concern right now as we're trying to figure out how to incorporate this into our CONOP is the fact that like with the UASs and the national airspace, the technology has gotten way ahead of the laws for governing vessels. So what these things are and how they can be utilized is still open in a lot of ways. So we're not even sure what they constitute right now as far as what type of vessel if they're a vessel.

Mr. HUNTER. I'm not talking about you learning how to regulate a new and amazing technology. What I'm saying is why don't you put it to use.

Admiral BUTT. Well, the question is, sir: If—what it is then determines how it can be used. What I'm getting at is the first lawyer answer I got on this stuff because it doesn't carry cargo and it's not

manned is it's sea debris. So now to take that a step further, sea debris—I put it in the——

Mr. HUNTER. We are deep in Government time right now. That's what that means. You really call it sea debris because there's no other nomenclature for it?

Admiral BUTT. That was the legal definition we got back. That creates a whole lot of questions when you go that direction. So we're in a place where——

Mr. HUNTER. The Government is ridiculous. It really is. That is insane, but go ahead. OK.

Admiral BUTT. So figuring out what this stuff is and how it can be used comes into play before we actually start utilizing. Now can it give me a potential? You betcha, because I see those things as potentially being the same——

Mr. HUNTER. Let me ask you. I don't understand. I don't understand. Just because we work for the Government—I work for the people, you indirectly work for the people—that doesn't mean we can't use common sense. So the fact that we don't have a definition for something right now that exists in our guidebooks that we have to look at to know what things are doesn't mean that the Coast Guard shouldn't be jumping on this thing before anybody else does.

The Coast Guard should be the ones who experiment with this type of technology, who put it to use, who save a lot of money doing it in the beginning. It doesn't have to go through any Government contractors at all because it's just out there sitting, waiting for you to buy it. You don't have to necessarily know what to call it to know that it could save you lots of money, make you very efficient and more effective on the oceans, right?

Admiral BUTT. Yes, sir. And——

Mr. HUNTER. Because we don't——

Admiral BUTT. Now you're at the R&D phase, and we are working with NOA on this program.

Mr. HUNTER. So what——

Admiral BUTT. Because we're trying to define it.

Mr. HUNTER. What I'm getting at, Admiral, is it's too easy, meaning you don't necessarily need NOA either. If the Coast Guard would just go and get these like other organizations have and says let's just use them, you don't necessarily know—have to know what to name it yet in the Coast Guard dictionary, right? It's obviously not sea debris, right?

Admiral BUTT. That's true.

Mr. HUNTER. It's an unmanned floating vessel, whatever you want to call it. I'm sure they'll have a cool name for it. The point, though, is that you should be on the cutting edge. These things are cheap, it doesn't take any defense contracting to do it, you don't have to do anything crazy to bring these onboard, to be able to track them on a wall screen. Literally, right here if we had a laptop hooked up, we could watch them, watch these things float about the ocean.

My point is this: Working for Government has made everybody slow and almost unable—there's no way we can keep up with the technology that's out there. So I think the most important thing for this entire system is that it's open architecture. It has to be open so that anybody over the next 50 years can plug in whatever they

want to into this, and you can use these unmanned floating vessels—there, I just got—UFVs, how about that? Unmanned floating vessels. You can use those—you can do a lot of different things. Just don't do what the other services did. Otherwise you're going to sink billions and billions of dollars and have something that does not work, because this is hard what you're trying to do, but it's not too hard. I mean companies do this all the time.

Admiral BUTT. Yes, sir, and that's why we're working with NOA on it to be able to start to understand that what we don't have—

Mr. HUNTER. It's not too complicated. I can tell you it's a floating surfboard with wings under it that has sensors on top. That's all it is. It's not crazy. They can tell you how hot or cold the water is and take pictures. It doesn't take a Ph.D. to tell you how to use it or implement it, right? It's not that hard.

Admiral BUTT. It's not that hard to actually get the stuff and have it sensing. The challenge becomes right now in our most threat environment, how do I distinguish—if I'm using, for instance, sonar data from them, how do I distinguish the sound of a fishing vessel that's engaged in legitimate fishing versus a fishing vessel that's engaged in trafficking. I know there's a fishing vessel there. It triggers that, but it doesn't do much than that at this point in time.

So trying to figure out how that plays in the overall scheme of accomplishing the mission is what we're still wrestling with. The beauty of it is we're working with NOA to get an understanding of the capabilities of these, and then as we learn that, we can figure out how to incorporate it into the mission set. So I'm not saying that we don't have an intention of doing that in the future, but right now we don't have a vision of how it helps us accomplish the mission.

Mr. HUNTER. OK. Well, I'd be happy to help you with that.

Admiral BUTT. There's a lot of people, sir, that are—really want to help us with that.

Mr. HUNTER. I recognize Ms. Hahn if you're ready. If not, I can recognize Mr. Garamendi.

Ms. HAHN. I was born ready.

Mr. HUNTER. Good.

Ms. HAHN. Thank you, Mr. Chairman.

So I obviously believe that this security of port should be our top priority. Our PORT Caucus, which is now about—actually about 90 members strong, Republicans and Democrats who have joined together just to focus on our ports. Security is a big issue. I represent the Port of Los Angeles, America's port, but I also believe that the First Amendment rights of our port and maritime workers must be respected, and I was concerned when I learned that the Coast Guard issued this new rule expanding safety zones around grain vessels in the Pacific Northwest.

So I'd like to know from you what data that you can provide that points to major safety or security issues that have surface that would necessitate an expansion of these safety zones. And how is the Coast Guard working with ILWU to ensure that their First Amendment rights are not infringed upon, particularly their need every once in a while to engage in water picketing?

Admiral BUTT. Ma'am, I'm going to have to get back to you on the record for that. I wasn't prepared to go there.

Ms. HAHN. On both those questions?

Admiral BUTT. Yes, ma'am. I wasn't ready to go there.

Ms. HAHN. OK. So you asked the wrong person who was ready.

Mr. HUNTER. Is that it, Ms. Hahn?

Ms. HAHN. That's it.

Mr. HUNTER. Mr. Garamendi is recognized.

Mr. GARAMENDI. I was going to ask a similar question. For the record, I will submit the question to you. It has to do with the new rule of how close picketers can get to ships that are coming in and out of ports, particularly in the Northwest, a very, very important question that we would like to have answers for. I see your staff behind you writing down questions. I'll just hand you the paper, and I'd expect you to get back to us forthwith like this week.

Admiral BUTT. I certainly will do that.

[The information follows:]

RESPONSE TO PART 1

There is some misunderstanding regarding the Coast Guard's recently reissued grain-shipment safety zones in the Columbia and Willamette Rivers. The Coast Guard's temporary interim rule (IR) published on June 4, 2013, did not "expand" the area of the vessel safety zones promulgated in January 2013. The safety zone distances for grain-shipment vessels remain unchanged (500 yards ahead of the vessel, and 200 yards abeam and astern). Instead, the June 4, 2013, IR carved out a smaller class of vessels—"grain-shipment assist vessels"—from the definition of the larger group of grain-shipment vessels. *Shorter* safety zone distances were assigned to these smaller vessels (100 yards ahead, 50 yards abeam and astern). The Coast Guard made this change because the existing 500/200 yard safety zone was disproportionately large for these smaller vessels, and it was not the intent of the Coast Guard to enforce that size safety zone around them. Under the June 2013 IR, protestors may come *closer* to grain-shipment assist vessels than under the rule published in January 2013. Unfortunately, the optics of establishing a new category of vessels in the regulation text, along with new enforcement of the grain-shipment assist vessel safety zones, gave the appearance of "expanding" the safety zone applicability when that was not the case.

Coast Guard on-water observations of navigational risks support the Coast Guard's decision to keep grain-shipment assist vessels within the safety zone, to reduce the risk of collision. River and bar pilots have raised safety concerns with navigating near vessels involved in protest activity. The pilots are extremely knowledgeable about the unique hazards of navigating on the river and the maneuvering characteristics of deep-draft bulk carriers and assist vessels such as towing vessels and pilot boats. Additionally, there have been two cases where vessel operators failed to heed multiple warnings and violated the safety zone by

maneuvering in front of grain-shipment vessels, placing themselves, and potentially the grain-shipment vessels, in danger.

The IR is intended to ensure that members of the maritime public, those participating in protest activities on the water, law enforcement personnel, and vessel crews are not injured. Recreational boating, fishing, and protest activity afloat in these safety zones is particularly hazardous because of the effects of strong river currents, the maneuvering characteristics of grain-shipment vessels, and the safety sensitive mid-stream personnel transfers conducted by grain-shipment assist vessels with which recreational boaters and protesters may be unfamiliar. Both grain-shipment vessels and grain-shipment assist vessels require sufficient room for maneuverability, to avoid collisions and minimize and mitigate other navigational risks. These vessels cannot stop immediately or make the sharp course adjustments that smaller motor vessels—such as recreational boats—can make.

RESPONSE TO PART 2

The Coast Guard respects the First Amendment rights of protesters. In preparing this temporary rule, the Coast Guard carefully considered the rights of lawful protestors. The safety zones created by this rule do not prohibit members of the public from assembling on shore or expressing their points of view from locations on shore. On the water, protestors may assemble in locations other than the established safety zones. In addition, the Captain of the Port has, in coordination with protestors, identified waters in the vicinity of these safety zones where those desiring to do so can assemble and convey their messages to their intended audience (including incoming grain-shipment vessels and grain-shipment assist vessels) without compromising navigational safety. The temporary interim rule identifies a point of contact for protestors to coordinate protest activities so that their message can be received without jeopardizing the safety or security of people or property in the area. Furthermore, the safety zones are only enforced when grain-shipment and grain-shipment assist vessels are actively maneuvering.

RESPONSE TO PART 3

The safety zone extends to waters 500 yards ahead and 200 yards abeam and astern of a grain-shipment vessel. For grain-shipment assist vessels, the safety zone extends to waters 100 yards ahead and 50 yards abeam and astern of the vessel. The public cannot enter into these safety zones without prior Captain of the Port authorization, in accordance with the process set forth in 33 CFR §165.T13–239.

Mr. GARAMENDI. OK. I want to pick up where Mr. Hunter had taken this—Chairman Hunter had taken this question, which is new technologies that are available—readily available today. The

U.S. Navy has spent a great deal of time, money developing not only the surface programs that Mr. Hunter talked about, but also underwater, unpersoned vehicles—we don't want to be sexist here, so we'll call them unpersoned vehicles—so that they might be available to be used for a variety of purposes.

Not wanting to plow the same field twice, but I would really like to see a further discussion—not necessarily a hearing, but a further discussion with the top command at the Coast Guard about how it can be flexible enough in its thinking about the ways in which you can accomplish your goals. Mr. Hunter was talking about surface observation. You said you would know whether there is a fishing boat nearby.

Underwater vehicles can also give you valuable information. You may not know whether it is a fishing boat or somebody intent upon bringing in contraband, but at least you know where it is, and you might be able to target it. So there's a whole series of issues that have to do with these new unpersoned vehicles, both surface and underwater and air. So further discussion should be forthcoming if you could take that into submission and get back to us on that, perhaps we'll call a hearing or at least an informal discussion about it.

Secondly, a similar question has to do with the U.S. Navy's use of unmanned drones—aerial drones. We'll call them unpersoned aerial drones. They are—will very soon be fielding a Global Hawk Naval version, which they call BAM, B-A-M. It has extraordinary capability to do many of the things that the Navy has set out to—excuse me—the Coast Guard has set out to do on its own. And the question I would ask without expecting an answer today is: What is the Navy and the Coast Guard doing together to utilize unmanned, unpersoned vehicles both floating, underwater, and aerial to fully comprehend the mission awareness situation.

Admiral BUTT. Well, sir, actually when it comes to the UASs, that does fall under my portfolio, so I'm able to discuss that. We are currently working with the Navy. We have liaison officers at Pax River embedded with their programs to go and work with them to see how we can utilize it with the Coast Guard.

But post-9/11, because of the advances in the intelligence community, for a lot of these assets out there, we already have access to the information. We don't have to actually field the assets ourselves to get access there. So as we're going forward, there may be several ways I can figure out if there's a fishing boat at this point in space, and it doesn't necessarily have to be any one asset that the Coast Guard fields.

Mr. GARAMENDI. I would like a further discussion with you about the integration of the Coast Guard and the Navy with regard to their unpersoned vehicles.

Admiral BUTT. Yes, sir.

Mr. GARAMENDI. Aerial and otherwise.

Admiral BUTT. We'd be happy to do that.

Mr. GARAMENDI. Thank you.

Yield back.

Mr. HUNTER. Ms. Hahn is ready again—is recognized.

Ms. HAHN. Mr. Caldwell, you've done a report on port security, and one of the things I—as I said earlier, I'm still very concerned

about—is the security at our Nation’s ports. I think our ports are some of the most vulnerable entryways into this country, and since 9/11 it seems like most of our attention has been focused on airport security and not so much port security.

Could you maybe just touch on where you think we still have some gaps in port security and if it’s something that Congress should address going forward?

Mr. CALDWELL. I testified for this committee last year on the 10 years since MTSA came into place. If I could just give some high-level comments, I think that part of the challenge now is sustainment. So we spend a lot of money to put programs out there, but maintaining them and keeping them, that’s an issue.

It’s an issue with the private sector and port authorities as well. As you know, they’ve got port security grants to put security improvements in place, but the moneys generally aren’t used to maintain those and keep them up. So just maintaining Coast Guard security operations is a challenge. They’re not necessarily based on actual threats as much as deterrence and improving maritime domain awareness, for example, escorting certain vessels and things like that.

And right now the Coast Guard’s pretty pressed to keep up the level of effort it had a couple years ago, particularly with small boat escorts. We’ve seen some positive things. When I was just in San Diego, CBP and Coast Guard were doing joint patrols just to try to save resources and maintain both of their efforts. But it’s critical for sustaining the efforts we have and keeping some kind of surge capacity.

So we’re operating on a lower level, which we have to do with the budgets we have now. But it’s important to maintain the ability to surge if we have a reason, like we actually get actionable intelligence on a threat or we have some kind of incident.

Ms. HAHN. Thank you.

Did you have a comment on that?

Admiral BUTT. Well, ma’am, one of the things we’re doing to try to help with the coverage because of the budget pressures and the number of patrols is we’re working with the university programs from DHA S&T and with the University of Southern California to utilize game theory as a way of optimizing and scheduling our patrols that make it look entirely random and shows—makes it harder for somebody to anticipate where the patrols will be.

So even though we’re having to slide back operations a bit, what we’re working on is ideas that will allow scheduling that gives the appearance that we’re out there a lot more than what we are, because it puts the boat in the right place.

Ms. HAHN. And of course, Brookings Institute released a report last week or the week before that highlighted cybersecurity as being a big weakness at our ports and another area of vulnerability. So I introduced a bill last year that passed the House and got stalled in the Senate, and I’m reintroducing it this year to ask our Department of Homeland Security to take another look at our parts some 11 years after 9/11, reassess, and see if there might be some gaps in our security that Congress could take another look at.

I know because of resources we’re cutting back. I know Congress after 9/11, one of the first laws they passed was 100 percent con-

tainer screening, which was clear this administration under Janet Napolitano pretty much told us it wasn't going to happen, it wasn't reasonable, not something they were even going to attempt to do, and again, the smarter approach, the layered approach, direct-based point of origin philosophy.

But I still think all of these have some vulnerabilities. I feel like those could be overcome, and I would like to see us—I think the technology exists, frankly, to screen containers much more than 2 or 3 percent, and I think we could do it without slowing commerce, and I think we could do it in a way that would make more sense.

Because one dirty bomb coming in a container in the Port of Los Angeles and Long Beach could cripple our national economy, could kill—we have 5,000 men and women that work on the docks every single day at least, and we have these—some of these ports are in residential neighborhoods. I think it's still a real concern and threat.

I know it's something that keeps me awake at night as I also live within a stone's throw of the Port of Los Angeles. So just want to know that I'm moving forward, continuing to push on another assessment, another look at port security and whether or not there are gaps that we could be told about in a classified situation and we could move to address that.

Admiral BUTT. Aye, ma'am. I'll take that back. And with regard to cyber, one of the things that affected our schedule in deploying these C4ISR systems is since 2004 the threat has become real, and so we've incorporated cyber defense into WatchKeeper and the other systems we're putting there.

So one of the things I think that's going—drive port partners into playing more with WatchKeeper is the fact—as the recognition of cyber issues becomes more prevalent through the agencies, and we've already got a system in place that we've got the defenses in place. I think that will help bring the port partners to our standards.

Mr. CALDWELL. Ms. Hahn, if I could add something, GAO, based on a request we got from the Senate Commerce Committee, is looking at cybersecurity issues within a port. We've been in touch with Los Angeles and other ports, so we'll be talking to them about that.

I also wanted to make a linkage between the topic of today's hearing which is MDA and some of the port security issues and some of the capability limitations we've talked about. We may get in a situation, whether it's with robotic surfboards or satellite or buoys or all kinds of other things that help us with our MDA that we're aware of a lot of things. But we don't have the capabilities necessary to do anything about it.

Again, I learned a lot from this trip to San Diego. You have the Mexican pangas coming up, running the drugs and trafficking people. There's an awareness that they're out there, but part of the problem is when they've got four 200-horsepower engines on their boat, even if Coast Guard was pretty close to them, can't catch them unless they had air assets right there and had authorized use of force. So we could get in a situation where we're going to maybe know more with advances in MDA than we can actually address or deal with.

Ms. HAHN. Thank you. But—and I agree, and the panga boats are a real concern to me as well. I mean one of them came onshore just a couple miles from my house, actually made shore with about 19 people who came ashore. So yeah, I'm very concerned about that for a number of reasons, so I just think it—I still want to know where our gaps are so that at least we have that information and we could make decisions in Congress about whether or not we want to address gaps in our port security.

Thank you. I yield back.

Mr. HUNTER. I thank my colleague from California, and we're almost done here. We have, probably, 5 minutes, Admiral. Our next panel is, I think, the CEO from Liquid Robotics.

We have Liquid Robotics here. If you could leave somebody here, that would be great. I mean we don't have to go through NOAA to figure out what their stuff does. But if you could leave somebody here, maybe they could just listen in. A couple of questions. The first, without objection, we want to accept the testimony from the International Longshore and Warehouse Union without objection, and here is the basic question I have here, finishing up.

Right now, you're in a major acquisition. You are in the middle of major acquisitions for all, for the OPCs, the FRCs, the National Security Cutters, because you spend hundreds of millions of dollars, rightly so, this time, trying to recapitalize the fleet. How do you know what your conduct of operations are, your ConOps, as you would say.

Admiral BUTT. Right.

Mr. HUNTER. How do you know what those really are if you don't know what technology is like unpersoned floating vehicles, or whatever you want to call them, that will help you determine how many vessels you would need in order to make sure places aren't being fished out, to see if there's vessels in the water in certain areas.

Your conduct of operations will be impacted greatly by the technology that's out there. So if you don't have the technology in place yet, and you're going to begin, let's just say within the next decade, how do you even know how many ships you need? Because you don't know how you're going to operate or what you'll need to do it, if you don't really know what technologies are going to impact that.

So you're kind of working blind on the one side, on the recapitalization, and we're doing the technology stuff too, but those things should interact with each other and have major impacts on how many ships you have to buy and on what kind of technologies that you use.

Admiral BUTT. Well, sir, that assumption would be good if we didn't have so few vessels to actually do it. If you think of the interdiction as a three-legged stool, you need cuing, and that's what we are talking about the technologies for. You need Maritime Patrol Aircraft actually go in and figure out if that's a bad boat or not, and then you need the end game to actually do the interdiction and in effect the purpose. Right now, the strongest leg of the stool the Coast Guard has is in my MDA side.

Mr. HUNTER. Say that again, Admiral. I am sorry.

Admiral BUTT. The three stools are MDA, which is the cuing, so I know where to send an aircraft or an UAS out to take a look to

see and identify what the target is. And then once I know the target is something I'm interested in, I need end game, either a cutter or a boat, depending on where it is at. If it is a cutter, usually, with an armed helo to be able to slow it down. So I need those three pieces to actually affect the interdiction.

So, right now, the problem the Coast Guard is having is I have more MDA than I have aircraft to send out to identify it and figure out if it's bad. And I have more aircraft hours than I have ships available to actually go out and effect the interdiction. So the longest leg of the stool right now is MDA, and I have the MDA, not only from our sensors, but through DOD.

The first priority is we need more ships to be able to effect the interdiction. Then the next driver will be we are going to need more aircraft or UASs to help with the cuing, and then we are looking at being able to go to a wider area to actually get it.

Mr. HUNTER. So I understand you are in such dire straits, you just need ships. It wouldn't matter whether you had sensors or not at this point, because you're not at the level to be able to pull ships back—

Admiral BUTT. Correct.

Mr. HUNTER [continuing]. If you didn't need them anymore.

Admiral BUTT. Yes, sir. So that's where we're putting our priority with our budget.

Mr. HUNTER. Thank you both for your time, and I have got one last question that is totally off the subject, but because you are the capabilities guru, we are going to ask you anyway. Does the Coast Guard still intend to select three OPC candidates for full-blown design, or will budget constraints result in a withdrawal of the current documented requirements and rescoping of the OPC requirements? Did you get that, or do you want me to ask it again? Did you understand the question?

Admiral BUTT. You're asking if we are going forward with the program of record or making adjustments. Right now, the plan is to go forward with the acquisition plan for the OPC.

Mr. HUNTER. And you have to get three finalists to the OPC. Right?

Admiral BUTT. That's the current acquisition plan, sir, yes.

Mr. HUNTER. And when is that going to happen?

Admiral BUTT. You've got eight in right now, and then select three.

Mr. HUNTER. Right. You have to pick three. When are you going to select three?

Admiral BUTT. I'll get back to you with that one, sir.

Mr. HUNTER. Roughly. Give me like this year, next year, next month, this month, next week?

Admiral BUTT. I actually have lost track of it.

Mr. HUNTER. OK. Anybody behind you know that?

Admiral BUTT. It's scheduled for the end of the fiscal year, so.

Mr. HUNTER. The end of the fiscal year. OK.

Admiral BUTT. Was to make the announcement by the end of the fiscal year.

Mr. HUNTER. OK. Great. And thank you both for your time, and hopefully we can just stay on this and do it right the first time,

and be different from everybody else that's doing the same thing. Thank you both. Appreciate it.

Admiral BUTT. Thank you.

Mr. HUNTER. OK. We have a second panel coming up, so please take your time. We are going to have a lot more people arrive here, I am sure. I just feel bad when there is nobody here.

[Pause.]

Mr. HUNTER. All right. Good morning, gentlemen and lady. Our second panel of witnesses includes Mr. Bill Vass, CEO of Liquid Robotics, which we talked about quite a bit here; Mr. Steve Morrow, president and CEO, Insitu, appearing today on behalf of the Association for Unmanned Vehicle Systems International; Ms. Lisa Hazard, our operations manager of the Coastal Observing Research and Development Center at Scripps Institute of Oceanography; and Dr. Newell Garfield, director of the Romberg Tiburon Center at San Francisco State University.

I would like to welcome you all. You all heard the first exchange. I understand, Mr. Vass, you have to leave by 1300, 1:00. Right? So please open your statements. Keep them as short as possible, and we can get around to answering questions. Thank you for being here. Mr. Vass, you are recognized.

TESTIMONY OF BILL VASS, CEO, LIQUID ROBOTICS; STEVE MORROW, PRESIDENT AND CEO, INSITU, ON BEHALF OF THE ASSOCIATION FOR UNMANNED VEHICLE SYSTEMS INTERNATIONAL; LISA HAZARD, OPERATIONS MANAGER, COASTAL OBSERVING RESEARCH AND DEVELOPMENT CENTER, SCRIPPS INSTITUTION OF OCEANOGRAPHY, UNIVERSITY OF CALIFORNIA, SAN DIEGO; AND NEWELL GARFIELD, III, PH.D., DIRECTOR, ROMBERG TIBURON CENTER FOR ENVIRONMENTAL STUDIES, SAN FRANCISCO STATE UNIVERSITY

Mr. VASS. Again, thank you very much, Chairman Hunter, and the rest of the distinguished members of the subcommittee for offering to—

Mr. HUNTER. If you don't mind, please pull the mics. I did three tours with artillery. I can't hear anything, seriously. Right next to your mouth would be good. Thanks.

Mr. VASS. Liquid Robotics is a venture-backed, Silicon Valley and Hawaii based company. Since 2007 we have been providing our customers around the globe with a revolutionary new way to observe, monitor and patrol the oceans and coastlines. We are doing this through the utilization of a platform called, "The Wave Glider." It is an unmanned, or I guess now we are saying "unpersoned" ocean vehicle, capable of precise navigation that can stay at sea for a year at a time without the need of fuel, without polluting, without putting human lives at risk.

By the end of my testimony, I will convey how this innovative wave and solar-powered platform can help the Coast Guard, exponentially, increase its patrol area coverage, increase operational effectiveness at a fraction of the cost and environmental impact of ships. In 2009 before this subcommittee, Coast Guard Admiral Salerno said, "Awareness is essential to everything the Coast Guard does." Matching people to their spills, tracking ships, all of those kinds of things are extremely difficult to achieve, unless you

have a strong domain awareness in the ocean. To do this, you need to be at sea 24/7, 365, through the harshest weather, gathering and processing data, monitoring marine conditions and traffic, and communicating this information to key stakeholders.

Historically, maintaining a long duration present at sea has been cost prohibitive. Sending ships out for long duration missions of 6 to 12 months can cost millions of dollars, put human lives at risk and pollute the environment significantly. Aerial assets have the same time, weather and cost limitations. With the advent of the wave-glider, the world's first, unmanned ocean vehicle powered solely by the Earth's natural resources, we have broken through the barrier of long duration operations by solving the energy problem of having it generate its own energy while its at sea.

The Wave Glider has stayed at sea for years at a time. Collectively, our fleet has traveled over 350,000 nautical miles, navigating the world's oceans on missions for commercial and Government customers. We have collected scientific data from the Gulf of Mexico to the Arctic, to Australia and all the world's oceans. We navigated across the Pacific from California to Australia, giving us the Guinness World Record for the longest distance ever traveled by an autonomous vehicle on the surface of the planet, and the first to cross the Pacific Ocean. With this long duration, all weather technology, we can help the Coast Guard greatly enhance its maritime domain awareness and information network, increasing the efficiencies of high-value assets for the Coast Guard's missions, such as search and rescue, port, waterways, coastal security, drug interdiction, border security and EEZ enforcement.

As noted, the beauty of the Wave Glider is that it can safely and economically travel into high-risk locations through all weather conditions and capture data that's not before really feasible. Oh. And I am going to give you some examples. We are working with NOAA's Atlantic Oceanographic & Meteorological Laboratory to measure the ocean surface temperatures during active hurricanes for better hurricane intensity prediction; literally, having a better understanding of how strong the storm is when it lands—not just where it is going.

As we have seen, preparedness for a tropical storm versus a category 4 hurricane is dramatically different and it significantly affects people's lives and the economies. And many of you on the sub-committee are from coastal towns, like myself, and you can't measure the tangible and intangible costs of preparing for a hurricane properly. Until the Wave Glider, there has not been a viable, safe way to send a mobile surface vehicle directly into a hurricane to collect real-time data.

Aerial drones can often get blown off-target in these kinds of situations. Stationary and moored sensors, by definition, are not mobile and can't move around in a hurricane, and frequently break in those conditions. Satellites that are circling 250 miles above the Earth's surface are challenged to collect data during those kinds of storm events because of the cloud cover. Imagine implementing the Coast Guard Asset that can survive a category 4 hurricane, one that can navigate to new locations to investigate and patrol, all while continuously communicating and computing lifesaving information.

We can and we have. To date, we have navigated and communicated through five hurricanes and three cyclones, including Sandy and Isaac, where we continue to operate in our oil and gas missions during the storms. Imagine what the Coast Guard could do with that type of capability. Our customers are anyone who operate in the ocean or move across it. They vary from Governments to large oil companies to scientific organizations and communications companies.

You may wonder what kind of data we actually collect on these things, and the answer is you can pretty much load any sensor out there. It is a pretty broad range of things. Think of the Wave Glider as a utility truck. You can load up a bunch of sensors on it as well communications and computing equipment. It's really very much like a floating computer center out there. So it can collect and process the data. You can load it up, send it on a mission for 6 to 12 months, covering tens of thousands of miles and collect your data, operate patrol. You can collect everything from water quality measurement, that, as you mentioned, you can collect the quality of the water down to two parts per trillion of hydrocarbon, or you can load it up with acoustics, radar, video and things like that to be used for patrolling.

I think this kind of long duration platform could have a significant impact on the Coast Guard's operations. So, in conclusion, around the globe, defense departments, coastal defense forces, oil and gas companies are faced with this daunting challenge to continuously protect and secure vast coverage areas with limited resources and shrinking budgets. The ability to have a real-time marine information can make the difference between life and death, the difference between apprehending the smuggler or not, the difference between avoiding an environmental disaster or not.

The overwhelming barrier has been providing affordable, persistent, long duration, multisensing data that can be monitored, detected, and is very mobile, and track and manage marine targets and provide marine conditions. As Admiral Salerno said so eloquently, "Awareness is essential to everything the Coast Guard does." To have this level of maritime awareness requires a mobile, unmanned resources, at the surface of the ocean, collecting data from subsea sensors and undersea vehicles, collecting surface data and sharing that information among trusted organizations in real time.

Liquid robotics is in a unique position to provide increased marine domain awareness today at a fraction of the cost of the alternatives. We would be honored to help the Coast Guard increase its maritime advantage. I would like to thank you for the opportunity to talk to you today and open it up for questions.

Mr. HUNTER. Thank you, Mr. Vass.

Mr. MORROW, you are recognized for 5 minutes; and, if you could, keep your testimony at 5, so we can get into the meat of this when you are finished.

Mr. MORROW. I certainly will.

Mr. HUNTER. Thank you.

Mr. MORROW. Thank you, Chairman Hunter, Ranking Member Garamendi and members of the subcommittee for inviting me to testify. My name is Steve Morrow and I am the president and chief

executive officer of Insitu, a subsidiary of Boeing. Our company designs, develops and manufactures high-performance, low-cost, unmanned aircraft systems or UAS.

I am speaking to you today on behalf of the Association of Unmanned Vehicle Systems International, AUVSI, the world's largest and oldest nonprofit trade association, representing the unmanned systems industry. The use of unmanned aircraft systems has grown substantially in recent history, due largely to advances in computing technology, but experts all say the industry is still in its infancy.

UASs hold an enormous potential to increase the reach and efficiency of current systems while reducing the risk of operations. I am here, primarily, to address the benefits of UAS in the maritime domain. UASs have the ability to access and survey vast expanses of our oceans and rivers to supplement the capabilities of unmanned vehicles and other platforms. Their critical, situational awareness that UAS provide could support search and rescue operations, anti drug or anti smuggling operations, environmental protection, antipiracy operations and many other missions. In these missions, UASs are capable of saving time, saving money, and most importantly saving lives.

One example was described by Vice Admiral Currier in a hearing before this subcommittee on June 26th, which he described an evaluation of a small UAS aboard the National Security Cutter *Bertholf*. That UAS, which was launched and recovered on the cutter flew 90 hours at sea providing substantial awareness beyond the reach of existing systems available to the cutter. In one mission, the UAS provided real-time monitoring and location information of a suspicious vehicle targeting and monitoring the vehicle until other Coast Guard assets arrived to interdict and apprehend the vessel's crew.

Seamless transfer between the UAS and manned aircraft vessels through regular communications resulted in a successful interdiction of over 1200 pounds of cocaine, the first such UAS effort by the Coast Guard. And an even more high-profile example several years prior, the same UAS provided persistence observation for military units during the rescue operation of Richard Phillips, captain of the *Maersk Alabama*, from Somali pirates in 2009.

In addition to U.S. Government application, commercial application of the UAS can benefit environmental monitoring and scientific analysis in regions not accessible by manned aircraft, or information gathering for commercial enterprises along coastal regions. As a Federal Aviation Administration finalizes its regulations of UAS in the national airspace, we believe that there will be further opportunities for U.S. Government agencies, in particular the Coast Guard, to work with commercial UASs in furtherance of its missions. The information gathered by UAS could be both cost-effective and timely, allowing all maritime operators the ability to do their jobs more economically, effectively and efficiently. There should be no doubt that the future of maritime domain awareness should include unmanned aircraft.

Mr. Chairman, the UAS industry holds the potential of being an engine of economic growth for our Nation as well. A study by AUVSI finds that the unmanned aircraft industry is poised to cre-

ate more than 70,000 jobs in the first three years following integration of UAS into national airspace. By 2025 that number is estimated to rise to 103,000 new jobs with an economic impact of more than \$82 billion over that period.

I thank you again for the opportunity to testify today and look forward to answering your questions.

Mr. HUNTER. Thank you, Mr. Morrow.

Ms. Hazard, you are recognized for 5 minutes.

Ms. HAZARD. Chairman Hunter, Ranking Member Garamendi and members of the subcommittee. Thank you for the opportunity to appear before you today.

I would like to start by taking the opportunity to thank Congress and Federal agencies for investing in ocean observations and encouraging a broad distribution of those data. I was recently made aware that the U.S. Coast Guard is able to reply on publicly available weather and ocean information from the Navy, NOAA, and research academic institutions; whereas, in other countries, a large portion of the Coast Guard budget goes to payment of environmental data. Public distribution of data would not be possible without the support of Congress. So thank you.

Prior to this hearing, I had the opportunity to review the Government Accountability Office or GAO report on "Coast Guard Guidance for the Common Operational Picture," or COP. I have based my recommendations on what I believe to be concerns addressed within the report. My experiences in working with operational applications for the U.S. Marine Corps and for search and rescue and oil spill response, as well as data management for the integrated ocean observing system, or IOOS, have shaped many of my views.

Many of my recommendations I discuss are based on my experience and do not necessarily reflect the position of Scripps. After reviewing the GAO report, it seems to me there was significant investment of time, funds and process documentation, as was required for a full-scale analysis of developing technologies for the Coast Guard. Conducting smaller scale demonstrations of developing technologies in partnership with agencies, such as Naval research, to test conceptive operations of new technologies could help significantly in determining worthy ventures.

Depending on the success of the demonstration, results could provide input to help the Coast Guard define analysis of risk, operational costs, manning requirements and transition to the fleet. Successful demonstrations can be scaled to support operations, while unsuccessful demonstrations provide valuable lessons learned and saved significantly on what would have been a full scale guidance procedure.

Additionally, I'd like to touch upon the concept of building operations for watch standards who need to make operational decisions based on the information that they have at hand. The GAO report references a system of systems, which in my definition includes not only a back end of data feeds, but also a front-end user interface. It seems as though there's been some frustration in designing a system that suits all needs, and such a system can be overly complex to the watch stander and not supported on existing hardware.

One approach that could prove useful in alleviating these challenges would be to build a modular applications. These applications

can reuse the back end infrastructure, or building blocks, if you will, but would have different interactive front ends or user interfaces. An excellent Coast Guard example of a mission driven development is the search and rescue optimal planning system or SAROPS. The design team for SAROPS included subject matter experts, programmers and users to ensure the application built was useful, accurate and functional.

Separate but compatible tools could be designed for tracking submerged oil leaks, monitoring fishing areas or maintaining vessel awareness. In my own experience with IOOS, we worked closely with pilots, harbor patrol and emergency managers on an interactive Web display with overlays of navigational charts, shipping channels, waves, winds and surface currents for the Port of L.A.—Long Beach, actually.

The users did not want us to use pop-ups for measurements as they blocked the underlying models. We did end up putting data in the text box in the upper left-hand panel of the page, ensuring they could see the whole picture. We would never have known that pop-ups would prove to be distracting if we weren't working with both COP developers and COP users in a build-test-build development cycle. We've been able to create modular problem and user driven applications while reusing our common data feeds in infrastructure. This allows us to be flexible without redesigning the whole system.

From my final comments, I'll touch base on HF radar, one emerging technology that is applicable to Coast Guard missions and maritime domain awareness. High-frequency radar systems are installed on land and can measure ocean circulations through receipt of radio signals. A national HF radar network or HFRNet, supported through NOAA with close to 130 systems, has been established to measure surface currents in near real-time and is currently used in multiple operational applications and distributed for Web services.

I previously mentioned the Coast Guard SAROPS tool. One of its primary data feeds is a short-term prediction system to show where a drifting person or vessel would be. The prediction model receives numerous environmental inputs with the recent addition of near real-time, HF radar surface currents. HF radar is also being developed for ship tracking and will extend over-the-horizon view of vessels, which is directly applicable to MDA.

Again, I'd like to thank you for this opportunity and happy to answer any questions.

Mr. HUNTER. Thank you very much. Do you actually work at the Scripps down by La Jolla Shores?

Ms. HAZARD. Yes, I do.

Mr. HUNTER. That's great. That's a great place to work. I grew up surfing there at the pier in back.

Ms. HAZARD. Pretty nice.

Mr. HUNTER. Well, thank you, Ms. Hazard.

Dr. Garfield, you are recognized for 5 minutes.

Dr. GARFIELD. Thank you, Chairman, and Ranking Member Garamendi for this opportunity to testify.

I am an observational physical oceanographer from San Francisco State University and a founding member of the Central and

Northern California Ocean Observing System or CeNCOOS, one of the 11 regional observing systems within the U.S. integrated ocean observing system.

My testimony actually corroborates very much with Ms. Hazard's. The ocean is critical for both the prosperity and safety of our citizens. Knowledge of the ocean environment is essential to this country. My testimony today is that thanks to the innovative approach that IOOS is taking, real-time environmental data are now readily accessible to the Coast Guard, and the Coast Guard is successfully utilizing these data.

In 2009 the U.S. IOOS was created by Congress as a Federal, regional partnership, charged with providing real-time and sustained observations on our coast, oceans and Great Lakes. NOAA is the IOOS lead of the 17 Federal agencies including the U.S. Coast Guard that are working together with local interest to provide seamless access to coastal data. Today, over 50 percent of the data provided to the global telecommunications system by NOAA's national data buoy center comes to NOAA from non-Federal sources, most of which are supported by the regional associations. In the past, numerical models was one of the primary ways to estimate circulation. Now with HF radar we actually have measurements and that greatly improves the ability to respond and determine trajectories.

My written testimony has three examples that I'll quickly summarize to illustrate how access to IOOS real-time observation data has improved the Coast Guard's marine domain awareness. In 2002, California voters invested \$21 million to install an array of 43 shore-based instruments, the HF radars that measure the ocean's surface currents in real time from the shore out of distance 130 kilometers, with a spatial resolution of 6 kilometers and updated hourly.

The 2005 interagency "Safe Seas" spill response exercise off San Francisco demonstrated the huge benefit of having access to real-time surface currents, causing one Coast Guard officer to explain "I love HF radar," and I believe she did that right in front of Admiral Lautenbacher. The same array was accessed during the subsequent 2007 Cosco Busan fuel spill, and this led NOAA to include HF radar data in the NOAA spill trajectory model used to provide environmental conditions to the Coast Guard.

The 2010 Deepwater Horizon incident was the first time that Federal responders had routine access to non-Federal information, which was enabled by the protocols developed by the IOOS data management system. In all three incidents, access to real-time currents improved response operations. And I think Rear Admiral Butt just said that's continuing to improve in the Gulf area.

Secondly, it has been shown that when HF radar data are available, the knowledge of currents can reduce the time of search and rescue patterns by up to two-thirds from model data alone, because the search area can be significantly constrained.

And the third example is the IOOS collaboration with the U.S. Army Corps of Engineers Coastal Data Information Program, CDIP, to deploy buoys that accurately measure both waves and swell at critical locations. In the San Francisco area, the National Weather Service, the Coast Guard and the commercial tugboat op-

erators requested that one of these buoys be placed on the San Francisco bar entrance. The number of Coast Guard responses in that area dropped from nearly 80 in 2005 before the buoy was deployed to less than 20 in 2009. A similar buoy at the Columbia River bar is monitored 24/7 by the Coast Guard to determine when conditions are too rough for safe passage through the bar.

It is important to emphasize that the data are obtained from many different sources instead of being restricted to a particular vendor or agency. It is also important to understand that these data are all available in open formats. No proprietary formats are involved. This will allow the SAROPS environmental data server to host over 50 different environmental products, and the IOOS structure allows many different users access to the data.

In conclusion, I would like to reiterate that the development of the IOOS system gives the Coast Guard unprecedented access to real-time environmental data. The Coast Guard, particularly SAROPS group and the unified area command group are commended for ensuring that agency has access to the environmental data essential for good maritime domain awareness.

The distributed observing infrastructure being developed by IOOS is as critical to the Coast Guard's functions as are its boats, aircrafts, piers and other infrastructure. This asset is needed by the Coast Guard and it needs Coast Guard support. I recommend that the Coast Guard commit to supporting IOOS and strive to utilize all nonclassified, environmental data available through the IOOS servers and ensure that the different divisions within the Coast Guard utilized common protocols to access the data.

I also urge the divisions of the Coast Guard to become members of their respective regional associations. Membership strengthens the collaboration between the organizations and provides a more effective mechanism to create operational applications in support of the Coast Guard mission. In fact, last year, CeNCOOS had their annual meeting at Liquid Robotics, and so right there we had that integration of different resources. Thank you very much.

Mr. HUNTER. Thank you, Dr. Garfield. Thank you panel for being here.

I have got a quick question, really quick about the HF. Is that like synthetic aperture radar, or is it totally different?

Dr. GARFIELD. Totally different.

Mr. HUNTER. Totally different. How far does it go off shore?

Dr. GARFIELD. It depends on the frequency. The lowest frequency we use has a range of 130 kilometers offshore.

Mr. HUNTER. And how big is it? It's an antenna, I would guess.

Dr. GARFIELD. It's just an antenna, that's a vertical antenna, and basically invisible.

Mr. HUNTER. Is it big?

Dr. GARFIELD. No, it's a whip antenna.

Mr. HUNTER. So you could put it on a surfboard and float it?

Dr. GARFIELD. You could.

Mr. HUNTER. Can it move? Like can you move it, or does it have to stay still?

Dr. GARFIELD. You could. In fact, the Navy has done tests about putting HF radar on ships. The problem is that the technology re-

lies on the Doppler shift that's being reflected off ocean waves. So if you're also on a moving vehicle, it's a lot more difficult.

Mr. HUNTER. You have to account for your movement as well as the ocean.

Dr. GARFIELD. Correct.

Mr. HUNTER. And the reason you use HF, that's what we use when we're talking to airplanes. Because as long as there is nothing blocking your line of sight, it can go forever for the most part. I mean we use HF to talk to planes. We use VH to talk to ground.

Dr. GARFIELD. Yeah. HF is down near FM radio frequencies, and there was a gap there where we could do some scientific work.

Mr. HUNTER. Gotcha. Dr. Hazard—Ms. Hazard—so what you would do is if a ship wasn't pinging, you could, basically, like we do with space, see where the holes are. So you could see what's out there, and you know if the ship is pinging. And if there's nothing pinging, but you see it on the radar, that's when you know that you have somebody who's not pinging from their ship, right, from the AIS or whatever system they are using.

Ms. HAZARD. But, sir, it's not actually using the AIS feed, but the radar—

Mr. HUNTER. What I'm saying is the Coast Guard, using the AIS and using the HF at the same time can see that there's no pinging from the AIS from a ship that exists that they see from your HF radar. Right?

Ms. HAZARD. That's correct.

Dr. GARFIELD. One clarification: It's not really radar. It is radio waves, and so the technology is not like a ship's X band radar at all. If you're familiar with radars, most people tune their radar not to see the ocean waves. What we're trying to do is capture the scatter off the ocean waves, and that's how you determine what the currents are. But a ship will give a solid signal. It will give a very strong return signal, but you won't know its location immediately.

Mr. HUNTER. Let me ask you this, too. What's the order of magnitude of difficulty? And this is for everybody, actually. What's the order of magnitude of more difficulty? Is it to do this stuff on the water as opposed to land? Like we were talking about unmanned systems. I would guess the Coast Guard would just hopefully piggyback with the Navy. It's way ahead on this stuff. And, once the Navy gets it down, because it's harder that they would just take what the Navy has, right.

And on the other side of it, you can't communicate under water with underwater systems. It's really hard, because to make waves travel through water, almost every single underwater platform is tethered to something so you can tell it what to do, or at least tell it and then let it go again, and then tell it later, once it surfaces, if you can communicate again. Right? So my question is this. How much harder is it. Why is it so much harder?

I think I just went through a few of those, and if you were to have your way and create a CON OPS for the Coast Guard, say here's how you use our stuff, I mean we're talking about the Coast Guard right now, and that previous panel said that they don't even know. They wouldn't know how to use it because it's not in their dictionary yet. It's called floating debris.

That's your Government answer, right, because they literally call it floating debris; therefore, we don't even want to look at what it does or how to use it until we can see it written on paper with a colon and a description of it. Right? So they are probably 20 years back. My question is if you were to tell us how to employ what you are doing and bring it all together to make it more effective and efficient, and save money for the Coast Guard, kind of what would that be. What do you envision? Mr. Vass, please?

Mr. VASS. Well, I would envision an integrated system.

Mr. HUNTER. Turn your microphone on, if you could. Is it on?

Mr. VASS. I believe it's on. The green light's on, anyway.

Mr. HUNTER. OK. That's great.

Mr. VASS. All right. I would envision an integrated system. We communicate to undersea vehicles all the time now with our Wave Glider, and then transmit that to satellite or to radar. We do that acoustically. Sound travels 10 times faster under water than it does through land, so we can communicate things down 6 kilometers down under the ocean pretty effectively, along with giving it positional information.

So what you really want is something like what we did in the harmony demo with Lockheed Martin where you have undersea vehicles communicating to these long duration surface vehicles, communicating to aerial vehicles, communicating to space assets. So you basically have ISR from the ocean floor to space in these environments, all autonomous sort of end to end. So the advantage of the Wave Gliders, we can stay out all year, and not many things can do that. We can navigate very accurately.

We are unpredictable as far as patrolling goes, because you can move us around and navigate, and control that both autonomously or semi autonomously from shore. And then we can receive signals from undersea assets, tip and cue aerial assets or aerial assets can tip and cue us, or the same thing with spatial assets. So you sort of get this continuous ISR at a much lower cost and much longer duration.

So, for example, aerial drones are going to stay up a series of hours, perhaps a series of days. We are out there all year. We can direct them. When we detect something, they can confirm an asset before an interdiction goes out. I mean it's very expensive to do an interdiction, so you'd save those high-value assets for interdiction; use the lower cost assets—like aerial drones and undersea drones and surface drones—for your monitoring a long duration monitoring.

I thought Mr. Morrow gave a great example of we could show where something was. Aerial drone comes over. It tracks it continuously, and then air assets and sea assets can interdict.

Mr. HUNTER. Like the admiral said, Admiral Butt said, that you have to cue. Cuing is a main part of maritime domain awareness, right?

Mr. VASS. Right.

Mr. HUNTER. So cuing, you can get people there quickly.

Mr. VASS. Right.

Mr. HUNTER. It's a big part of knowing what's going on.

Mr. VASS. Right. And part of our design criteria for the Wave Glider; it's actually a high-performance computing center. We have

many cores of onboard processing. I know you have an IT background, so you understand some of that. It is a 24-socket, multicore processing system on board running Linux and Java, so we can run a lot of the cuing and tipping algorithms on board, along with sensor fusion and data reduction in situ when we collect the data. And that allows us to be this sort of long duration platform, so we can collect huge amounts of data. You don't really want to send home—you know—365 days of waves in the ocean. You want to process the data onboard, and send home when you see a ship, or when you see a whale or you see things that are interesting, and we have the ability to do that with our platform.

Mr. HUNTER. Thank you, Mr. Vass.

Mr. MORROW. To speak more generally to the admiral's dilemma of writing requirements for this new technology, our lessons learned from Afghanistan and Iraq was that until the war fighter actually got his hands on the system, he didn't really know how to use it. He had a notional idea how he would use it, but that radically changed. When we first got to Fallujah, again, they had a general idea. A couple months of using the system, they found it used in a totally different way, and that's what's involved—

Mr. HUNTER. You know. I was one of the first forward observers to shoot artillery off of an unmanned system with a corporal with a laptop on his back in Fallujah in 2004. Yeah. That hadn't been done a whole lot yet at that point.

Mr. MORROW. Correct.

Mr. VASS. Did you hit the targets?

Mr. HUNTER. We did hit the targets, a lot of them. Yeah.

[Laughter.]

Mr. VASS. Just checking.

Mr. HUNTER. It was fulfilling.

Mr. MORROW. So until the Coast Guard actually gets the systems deployed, I think they won't have a full appreciation of what they can do with them.

Mr. HUNTER. Well, that's not good that they won't know how to integrate them into their operations until they have them in their hands?

Mr. MORROW. Right. From an acquisition standpoint, it is a dilemma. It's an issue.

Mr. VASS. Yeah. And I think the platforms don't evolve properly until they have them in operation, as well. So until you've been using them and you get feedback from the end user who's relying on it every day and what needs to be changed, what the performance characteristics are, what kind of data is most useful, all of that requires piloting and demonstrations, and test processes, which of course we're doing right now with the Navy.

Mr. MORROW. Right. Our technology refresh rate is occurring well inside the do-loop of the acquisition procurement cycle.

Mr. HUNTER. Ms. Hazard?

Ms. HAZARD. I'll just make two points in addition to what's been said. The HF radar technology is nice, because it is land-based and fixed. And so not out in the water where systems can require significantly more maintenance. So the maintenance of the system is easier. The Coast Guard needs all those applications together. And, also, just in regards to the Coast Guard, where there is a lot of the

turnover. Someone becomes familiar with the technology, and then you get an expert user. And then they're gone a year later. Scripps staff retain the technology expertise and can train users.

For example, we have been working with special warfare, showing them how to use the unpersoned autonomous vehicles and then maintaining that technical expertise and continuing to work with them as that turnover continues. So we maintain the knowledge base and can get folks up to speed very rapidly so that they are ready to go at the start of their service.

Mr. HUNTER. And I would guess too if you're doing port security you don't need more than 130 kilometers offshore. That's well within what you would need. How many miles is that?

Dr. GARFIELD. It's a little over 100 miles. It's about 100 miles, nautical miles.

Mr. HUNTER. Nautical miles. And so that's well outside of a nuclear yield or something like that, and dipping in the wind and stuff like that.

Mr. VASS. I think one thing that's important to point out, in the commercial world where we operate, we generally operate these as a service, and in some cases for the Department of Defense we do as well. And I think that's one way to stay in situ, if you like the do-loop of procurement, is just say we want this much information and we want this level of availability and make it our problem in commercial industry, solve that problem. I know Insitu does the same thing. They operate it as a service.

Mr. HUNTER. You don't think that the Coast Guard should try to make this on their own?

Mr. VASS. No. I believe even operating it it would make sense they would put mission requirements in place and say "Here is the data we need." Here is the availability we need—those kinds of things—and then let commercial enterprise do the day-to-day operations and operate it as a service for them.

Mr. HUNTER. Dr. Garfield?

Dr. GARFIELD. Yeah. Chairman Hunter, I would just add one thing. I think the three other speakers covered it very well, but as I mentioned in my closing remarks, the IOOS regional associations are really a valuable asset for the Coast Guard to take advantage of; and, if the different divisions were in the Coast Guard, actually partnered and joined in on these meetings and participated, they would know exactly what Liquid Robotics could do. They would know exactly what the assets are in their area.

The other is I have been able to go into the Coast Guard Search and Rescue there on Yerba Buena Island. I have a much better idea of what their needs and what their capabilities are, which has helped us sort of tune some of the data, some of the information, to make it more beneficial to their needs. So that give and take, outside of some purchasing requirement, would really help define their mission and show them what is available to be successful in their mission.

Mr. VASS. Right. I think it's interesting to point out we work very closely with the Coast Guard as a user of Coast Guard services, because we file a Notice to Mariners in all our operations. The Coast Guard has given us input on how we should flag the vehicle; what kind of AIS we should transmit; what kind of marine radio

we should use, and what kind of lighting we should use what are the COP regs, all those kinds of things. They've been tremendously helpful and very active as a service provider to us. And I just want to make sure that's noticed.

So the folks on the ground are very familiar with the Wave Glider, because we are operating in all their areas all the time, and they are always taking this into account. They're just not a user of our service. So it's interesting from that aspect for us, but they've been tremendously supportive. And I think that's important to point out. They really do tremendous work for us in ensuring how we operate and where we operate, and that we do it with maximum safety and maximum capability as well.

Mr. HUNTER. Thank you. Mr. Garamendi, you're recognized for as long as you like.

Mr. GARAMENDI. Mr. Chairman, thank you very much for this very, very important hearing. Mr. Garfield, it's good to be working with you once again. I notice when I was reading through the testimony and looking at what you had done since I left the Lieutenant Governor's office, you've come a long way. Most of the things I really wanted to get into have been covered, which is a description of what you're doing; but, we don't have.

And I'm sorry the admiral left, because I thought he'd be sticking around and we could put him back up here and ask him some questions. Apparently, your floating devices, Mr. Vass, are not sea debris.

Mr. VASS. No. They are not. They're a very controlled navigation devices that communicate and make their own decision.

Mr. GARAMENDI. Apparently, from your last comments, the Coast Guard recognizes there's something more than debris.

Mr. VASS. They do, but they don't have a legal definition. So they really have. That is a challenge for us.

Mr. GARAMENDI. The Chairman came up with a definition, "unpersoned floating vessel."

Mr. VASS. Unpersoned floating vessel, yeah. We usually refer to it as an unmanned surface vehicle. But, now—

Mr. GARAMENDI. It's very sexist?

Mr. VASS [continuing]. Yeah, very sexist. So I guess it will be unpersoned surface vehicle from now on.

Mr. GARAMENDI. I think where I'd like to take this is to where you're talking about the integration of your technologies into the Coast Guard's operations.

Mr. VASS. Yeah.

Mr. GARAMENDI. The Chairman correctly pointed out that the Coast Guard really isn't well-suited to develop the technology, but rather to use it and adapt it. And I think what I'd like, to make a statement or statements, and then have some response. It seems to me we ought to encourage the Coast Guard to work with your systems, and you have four or five different systems here, to acquire the knowledge to determine how best to use the systems that you have to inform their normal work.

Mr. VASS. Yes.

Mr. GARAMENDI. This also involves the Navy. And I just stepped out during the early parts of your testimony to take to the Air Force about their ISRS, some of which are applicable here. So I

think what I'd like to do is how would you, if the Coast Guard was still here, if Admiral Butt was still here, I'd ask how would you integrate. How would you capture the information? How would you see the Coast Guard doing that? Let's start this way. We'll go left to right, or right to left. Mr. Vass, if you would?

Mr. VASS. As I mentioned before, I would look at an integrated platform from undersea assets, surface assets, aerial assets and satellite assets. The nice thing about our platform is it patrols like a vessel patrols. So someone trying to interdict your coastline.

Mr. GARAMENDI. Excuse me. I'm more interested in the organization. How would you want them to work with you? How would you want the Coast Guard to work with you?

Mr. VASS. So, for us, specifically, would be to basically hire us as a service to provide information to them where they're most interested and where they have the most critical information to gather, and define for us what information needs to be gathered on a 24 by 7 basis. Tell us what format they want that information that will be most valuable to them, and then interact with us to help us improve the information we provided them and make our platform better to meet their needs.

Mr. MORROW. I would second the services approach, however, I'd also add that in their system of systems architecture, I found it always works best if you define the interface standards as close to commercially viable standards as possible. That way I'm motivated. I can hire people that know those interfaces to remain compatible with their overall systems architecture.

Mr. GARAMENDI. So put aside the not invented here syndrome and go with already is invented.

Mr. MORROW. Hm-hmm. Correct, yes.

Mr. GARAMENDI. But you cover a variety of systems, your organization or association does. Has the Coast Guard worked with your association in developing knowledge about the various types of systems that are out there?

Mr. MORROW. I don't know that they have. I'm sure they've talked. They are investigating small UASs as we speak. We've done one demo with them, and we'll do another first quarter of next year. So they are beginning that communication process.

Mr. GARAMENDI. Ms. Hazard, as you pointed out very specifically how they could, if you'd like to go back and expand on that I'd be happy to hear it.

Ms. HAZARD. Sure. I made two points. I guess one using small scale demonstrations to the scale up to opportunities that can provide the analysis, costs and many requirements for doing these types of demonstrations. But on the data side for integration, within academia there is a whole host of folks working on common data formats and interoperability. And so I guess for the Coast Guard my recommendation would be to use the open geospatial consortium, which is a global group working on data standards.

We are using network common data formats that can integrate easily within Google maps, open layers. A lot of the open source architecture, and even for a lot of the time series data, asking time series and just the basic file structure hierarchy works really well for designing and integrating these, and we do that within our lab on multiple meteorological sensors, autonomous vehicles, HF radar,

and so I can understand the conflict of having classified and unclassified systems.

So my recommendation, again, would be using the modular approach and only using those data fees that are required for your mission so that you're not cluttering your work space for these large standards and they're getting the information that is needed. And a lot of the open architecture can down-size those data feeds, because when you're integrating large, satellite images and everything, they can be massive and that can bog down a system, because you're transmitting gigabytes into your application. But, newer standards are able to disseminate that data, and so that the viewer is only looking at—your system is only bringing in a small portion of that data for your operating picture. And, so, my recommendation would be to use those open architecture standards and Web services. And then for the classified systems, they might have the entire picture. But, for the mission-driven systems, to keep it in the unclassified level, just building modular applications.

Mr. GARAMENDI. Garfield?

Dr. GARFIELD. So you let the education professor in me come to the forefront. What's really worked for us was actually getting into the Coast Guard and talking to people. I mean these are very busy people. They don't have much time. What we did is we actually went to them, said, look. We're going to give you presentations. We're going to give you workshops.

The lieutenant commander who is in charge of search and rescue in San Francisco, she had my phone number. And so when there was an incident and they had questions, she knew who to contact. She could get information from us, directly. And I really think that through the IOOS mechanism and the regional associations, building those partnerships is really the critical way to go forward with this.

Mr. GARAMENDI. Mr. Chairman, it is not clear to me how the Coast Guard is learning and using, and certainly integrating these technologies. There's some indication that they do some. From the earlier testimony today, it appears to be so they are thinking about building massive systems of their own, rather than using what might already be available.

I'm not exactly sure how to proceed here until we have a conversation with the Coast Guard about how they are accessing systems that can be useful to them in gathering and achieving their goal on understanding the marine environment. Perhaps we ought to ask them that kind of question in detail. And if the answer comes back—because I think it might—that it's sort of but not much, we may want to develop some sort of a round table system or force them to develop it. And sit down with the various kinds of systems and technologies that are available and learn, rather than trying to invent it themselves and develop it themselves, which proves to be difficult and not very successful.

Mr. HUNTER. Absolutely. In fact, what we'll do, we'd like to follow this up with another hearing or a round table when the Coast Guard stays, and you're here at the same time. And the Coast Guard captain back there listen to us, but it would be great if we could have some interaction and be able to ask them, hey, are you using this right now, and exactly how do you want to use it to

them. And I don't think they are prepared right now to answer that question.

I also don't think they are prepared to talk about how it would change their recapitalization efforts; change what type of ships they need to build; how many of those ships they need to build; where they're going to operate those ships; what their conduct of operations. All of that gets impacted as you bring technology into the game, and it is going to put pressure on different sides of their systems. And you're going to have things change. And I think we need to figure out what that is.

This is not a full hearing. A lot of people did not come, but don't let that take away from how important this is and what your testimony will be used for going forward. Because John is here and I'm here. We had Mr. Meehan and Ms. Hahn, and we are going to take this and make sure that they make the right decisions using what's available to us right now. We are going to make sure of it, because if we don't get involved and conduct the oversight, then bad things happen, as we've learned.

So I'd like to thank everybody for being here and with that, if Mr. Garamendi has no more questions, the hearing is adjourned.

[Whereupon, at 1:05 p.m., the subcommittee was adjourned.]

**Statement of the Honorable John Garamendi
Ranking Democratic Member**

**Subcommittee on Coast Guard and Maritime Transportation
Hearing on "How to Improve the Efficiency, Safety, and Security of Maritime
Transportation: Better Use and Integration of Maritime Domain Awareness Data"**

Wednesday, July 31, 2013

Mr. Chairman, thank you for convening this morning's hearing to re-evaluate and assess the Coast Guard's important Maritime Domain Awareness activities.

Maritime Domain Awareness, or MDA, is defined by the Coast Guard as our understanding of anything in the global maritime environment that can affect the security, economy, or environment of the United States. It is no exaggeration to say that the reliability, safety and security of the maritime commerce that flows into and out of U.S. ports depends on the Coast Guard's MDA capabilities to provide actionable intelligence to identify potential threats and to make tactical decisions.

Fortunately, the Coast Guard has made demonstrable progress to improve its MDA capabilities over the past decade. The amount of data that commercial vessels must submit to the Coast Guard regarding their cargoes, registries, crews, routes and arrival times are much more stringent. New vessel tracking programs, such as the Automated Identification System (AIS) and Long Range Identification Tracking System (LRIT) have been implemented to improve the Coast Guard's global awareness of vessel traffic, and most important, to identify threats far outside U.S. waters.

Despite these advancements, other MDA initiatives have been less successful. Integrated Operations Centers, or IOCs, which were intended to improve interagency coordination between the Coast Guard and other Federal, State and local law enforcement agencies, have been effectively shelved in favor of "virtual" IOCs. Additionally, development of a Common Operating Picture, or COP, remains unfinished despite the Coast Guard spending far in excess of what was originally budgeted to acquire these capabilities.

The end result after ten years of investment by the Congress and development by the Coast Guard appears to be a mixed bag. More sophisticated assets and resources are devoted now to MDA than ever before. Also, the Coast Guard appears much more capable of providing actionable intelligence to coordinate activities with its law enforcement partners.

But two lingering questions remain: will the Coast Guard ever complete the development of its MDA capabilities as first envisioned, and second, will present budgets be able to sustain these MDA capabilities over the long-term? It is these two questions that I hope our witnesses can shed some light on this morning, and I look forward to their testimony. Thank you.

A handwritten signature in black ink, appearing to read "John Garamendi". The signature is fluid and cursive, with a large initial "J" and "G".

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**TESTIMONY OF
REAR ADMIRAL MARK BUTT
ASSISTANT COMMANDANT FOR CAPABILITY**

**ON
“COAST GUARD COMMON OPERATIONAL PICTURE –
INTERAGENCY OPERATIONS CENTER & C4ISR”**

**BEFORE THE
HOUSE SUBCOMMITTEE
ON COAST GUARD AND MARITIME TRANSPORTATION**

JULY 31, 2013

Good morning Chairman Hunter, Ranking Member Garamendi and distinguished Members of the Subcommittee. It is a pleasure to be here today to update you on the Coast Guard's activities to improve our Nation's Command, Control, Computers, Communication, Intelligence, Surveillance and Reconnaissance (C4ISR) capabilities as they specifically relate to Enterprise Architecture, interoperability and data exchange for Coast Guard operations.

The Coast Guard continues to improve its operational effectiveness through modernization and management of its C4ISR systems. The dynamic and demanding operating environment in the maritime domain demands our C4ISR capabilities be interoperable and flexible in order to deliver the right capability, at the right time, to our operational commanders and deployable assets. In addition, these systems must be standardized across our assets to maximize effectiveness and affordability to ensure long-term sustainability.

C4ISR Enterprise Architecture

The Coast Guard uses C4ISR systems to produce actionable information, improve situational awareness and enhance collaboration among Coast Guard operators and our partner agencies. At the tactical level, this information helps command staffs effectively allocate resources, prioritize missions, and coordinate operations. At the strategic and national levels, these tools improve maritime domain awareness; a critical component of our maritime safety and security missions.

The Coast Guard's C4ISR management strategy objectives are to address obsolete or redundant technology and bring new capability to the operators at a faster rate. In order to upgrade overall C4ISR capabilities, the Coast Guard is improving its C4ISR requirements management from the early Research, Development, Test & Evaluation (RDT&E) stage, through systems acquisition, and continuing through the sustainment lifecycle. We do this by leveraging existing Department of Defense and other partner technologies, employing best practices throughout the acquisition process and through close consultation with operational commands where we continuously evaluate capability and capacity shortfalls.

This strategy allows the Coast Guard to reduce redundancy and enhance performance to meet the broad demands of both our operational units and command and control entities.

These strategic objectives can be achieved through effective Enterprise Architecture development and management, which will enable the Coast Guard to quickly respond to a variety of changes in the operational environment while reducing support costs through the establishment of a cooperative and streamlined support structure. The end results are standardized systems, enhanced availability, more efficient and effective repairs, and minimized operational risk during maintenance and upgrades.

Common Operational Picture (COP): The central component of effective C4ISR is searchable and discoverable data managed, moved and formatted within a Common Operational Picture (COP) that provides operators with the information needed to carry out their missions. Aligned with Chairman, Joint Chief of Staff Instruction Common Operational Picture Reporting Requirements (CJCSI 3151.01), the COP is designed to receive inputs from disparate information sources, process and correlate the data, and distribute it through the enterprise across multiple security domains.

Primary Data Sources Included in COP:

Nationwide Automatic Identification System (NAIS): NAIS uses a series of shore-based transceivers along the coast of the United States to facilitate vessel tracking. The Coast Guard has deployed interim NAIS receive capability in 58 ports and major coastal areas. This system is currently being recapitalized with a permanent transceiver system to provide both transmit and receive (transceive) capability using Rescue 21 Remote Fixed Facilities (RFFs) to leverage existing antenna and network infrastructure. The permanent transceive system extends receive capability from 24 to at least 50 nautical miles and adds 24 nautical miles of transmit coverage. NAIS is the primary source of vessel tracking data to the Coast Guard COP providing an average of 73,000 vessel position reports daily. The COP is the primary tool for disseminating AIS data throughout the Coast Guard and to the Department of Defense and other domestic and international partners.

Long Range Identification and Tracking (LRIT): LRIT is a designated International Maritime Organization (IMO) system designed to collect and disseminate vessel position information received from IMO member state vessels subject to the International Convention for the Safety of Life at Sea (SOLAS). It is a complementary system to NAIS, providing offshore tracking of all U.S. flag vessels throughout the globe, and IMO member state ships 300 gross tons or greater on international voyages that are either bound for a U.S. port or traveling within 1,000 nautical miles of the U.S. coast. The Coast Guard maintains a National Data Center (NDC) that stores the positions of all foreign and domestic LRIT ships. This information is available in near real time, with no more than six hours between reports. LRIT provides an enhanced level of Maritime Domain Awareness.

Air Marine Operation Center (AMOC): The Customs and Border Protection's (CBP's) Office of Air and Marine's AMOC, as the national law enforcement interdiction center, collaborates and exchanges data with the Coast Guard COP, providing Coast Guard with a Counter-Narcotics Air and Marine Picture.

Department of Defense (DoD): The Coast Guard is a member of the DoD Global COP Architecture and we are the primary data provider to NORTHCOM's Situational Awareness Geospatial Enterprise (SAGE) system. In common terms, SAGE can be compared to "Google Earth" albeit with much greater capability.

Contributors to the COP:

Shipboard Command and Control (C2) Systems: Shipboard C2 systems, such as Shipboard Command and Control System (SCCS) on legacy cutters, and Coast Guard Command and Control (CGC2) onboard the National Security Cutter (NSC) provide operators full interaction with the COP, allowing the integration of organic sensor data into the enterprise COP. Seawatch is slated to be the C2 system used for the Offshore Patrol Cutter (OPC) acquisition and is presently in use aboard the Fast Response Cutter (FRC). Additionally, Seawatch has been developed to replace the legacy SCCS on the in-service High and Medium Endurance cutter (HEC/MEC) fleet. This will standardize system architecture across the cutter fleet and provide unprecedented integration of ship and shore data into the COP.

Shore Command Control System: The primary C2 system ashore is the Global Command and Control System – Joint (GCCS-J), the DoD system of record for C2. Fielded at Headquarters, Area, and District Command Centers, this system allows personnel full COP interaction and integration of organic sensor data into the COP.

Airborne Command and Control: The mission systems currently installed on the HC-144A and HC-130J aircraft are a variant of the CGC2 system installed on the NSC. As such, they provide full interaction with the COP, allowing aircraft to send organic sensor data to the enterprise COP. The systems integrate collection of AIS, RADAR and Electro-Optic/InfraRed (EO/IR) imagery and allow it to be transmitted off the aircraft while in flight, provided adequate connectivity is available.

Viewers of the COP:

Command and Control Personal Computer (C2PC): C2PC is the most prevalent C2 System in the C4ISR Architecture and allows viewing of COP data on a CG standard workstation.

WatchKeeper: WatchKeeper provides access for users from multiple agencies and organizations with a single user interface and connectivity to numerous authoritative data sources while leveraging open system architecture for future improvements. WatchKeeper access has been provided to 26 of 35 locations. WatchKeeper has been proven operationally effective and has benefited from CG and other agency blue force tracking capabilities.

Enterprise Geospatial Information System (E-GIS): The Coast Guard E-GIS contains a storehouse of information, including maps and charts, originally developed to support the viewing and exchange of Geospatial data, such as critical infrastructure information. The operational utility of E-GIS and the continuing effort to enhance its service offerings make it the primary viewer of dynamic mission data used by the field.

Communications

Timely interactions and exchanges between units and operational commanders would not be possible without a comprehensive communications infrastructure. In addition to improved direct unit-to-unit communications capability, the Coast Guard is pursuing Internet Protocol (IP)-based connectivity and increased bandwidth to enable timely exchange of information and C4ISR data across domains. Projects primarily focused on this objective are:

Rescue 21 (R21): R21, the Coast Guard's advanced command, control and direction-finding communications system, was created to better locate mariners in distress and save lives and property. R21 deployment will be complete in 2017. R21 is operational along the entire Atlantic, Pacific and Gulf coasts of the continental United States as well as along the shores of the Great Lakes, Hawaii, Puerto Rico, the U.S. Virgin Islands, Guam, and the Northern Marianas Islands, covering approximately 41,871 miles of coastline. The deployment of digital selective calling (DSC) and improved transmit and receive capability to Alaska and the Western Rivers is in progress, with expected completion in the next 4 years. R21 recapitalizes the National Distress and Response System, which has been in use since the 1970s. R21 can more accurately identify the location of callers in distress via towers that generate lines of bearing to the source of VHF radio transmissions, significantly reducing search time. R21 coverage is out to a minimum of 20 nautical miles from the coastline. By harnessing state-of-the-market technology, R21 enables the Coast Guard to execute its search and rescue missions with greater efficiency. It improves information sharing and coordination with the Department of Homeland Security and other federal, state and local first responders, and can also identify suspected hoax calls, conserving valuable response resources.

Commercial Satellite IP Connectivity (COMMSATCOM): The Cutter Connectivity project will supply IP-based internet connectivity to all Coast Guard cutters one hundred and ten feet or larger. To improve available bandwidth at a significantly lower cost, the Coast Guard has started to deploy a new Ku band COMMSATCOM system on most cutters. This system triples the available bandwidth, at a fraction of the cost of other systems. Installation on most of the patrol boats is complete and installation is scheduled to start this month on larger cutters. The system provides increased bandwidth to allow underway assets to conduct e-business as well as better access to shore side data sources, such as the COP.

Cellular Over the Horizon Enforcement Network (COTHEN): To improve the reliability of long range communications and leverage existing resources, the Coast Guard has partnered with CBP in transitioning existing High Frequency (HF) radio systems to function with CBP's Cellular Over The Horizon Enforcement Network (COTHEN) Automatic Link Establishment (ALE) System. The Coast Guard has completed the deployment of COTHEN Remote Control Consoles (RCCs) to all Sector, District and Area Command Centers.

The RCCs allow the Command Centers to access the CBP's high frequency automatic link establishment (HF-ALE) network for long range tactical communication with all aircraft.

The Coast Guard and CBP are researching how to increase the COTHEN coverage by merging it with select Coast Guard-owned sites in Alaska, Guam, Boston, Point Reyes CA, and Hawaii to improve coverage system-wide, and specifically in the Arctic.

Military Satellite Communications (MILSATCOM): The Coast Guard has begun upgrading MILSATCOM systems throughout the service. This upgrade will replace outdated and non-supportable hardware with Mobile User Objective System (MUOS) and Integrated Waveform (IW) compliant systems to ensure the Coast Guard remains fully interoperable with our DoD counterparts.

Intelligence Support to the COP

The Coast Guard participates in a number of global and regional cooperative vessel tracking and information systems such as Nationwide Automatic Identification System, Vessel Management System, Vessel Traffic Service, Automated Mutual-Assistance Vessel Rescue System, Long Range Identification and Tracking, the Ship Arrival Notification System, and the National Vessel Movement Center, all of which contribute greatly to the nation's maritime domain awareness (MDA). This information is distributed through the classified GCCS, unclassified GCCS and C2PC to ensure the Coast Guard and its maritime partners receive mission-critical information.

The Coast Guard also has afloat systems that provide interoperability with Intelligence Community partners for maritime domain awareness for senior decision-makers and tactical commanders. Specifically, major cutters support classified communications via SIPRNet and the new National Security Cutter (NSC) is outfitted with a Secure Compartmentalized Information Facility (SCIF). In addition, the Maritime Intelligence Fusion Centers fuse information from both classified and unclassified intelligence, law enforcement, and other partners to support tracking of vessels of interest and inform operational planning.

Future Plans and Technical Challenges

Coast Guard efforts to improve information sharing through interoperable, enterprise-wide and net-centric solutions will help improve business processes and mission execution. In order to accomplish this objective, the Service is focusing on system development and data standardization that is compliant with the National Information Exchange Model (NIEM) and facilitates a cloud computing environment. This effort is absolutely essential for system sustainability, adaptability and future mission effectiveness.

Coast Guard One View (CG1V) is a new information technology (IT) development program designed to converge existing Coast Guard mission and mission support IT systems into a common viewer. Through the use of a common application framework, CG1V will provide operators a single user interface that is agile and can adapt to changing technology and user needs. WatchKeeper will capitalize on CG1V capabilities to develop system enhancements based on planned migration to an open architecture and process improvements.

Accurate and timely Blue Force Tracking (BFT) remains a key objective in our system development efforts. Large cutters such as the National Security Cutter and Medium Endurance Cutters equipped with Shipboard Command and Control System (SCCS), Coast Guard Command and Control (CGC2) or Seawatch, along with missionized HC-144 and HC-130J aircraft are capable of transmitting their position using Global Command and Control System (Joint) (GCCS-J). Some response boats are not equipped to provide asset tracking beyond voice-transmitted position reports and cannot automatically or manually feed information into a COP.

The Coast Guard is investigating the feasibility of deploying a hand-held Distributed Tactical Communications System (DTCS), which may provide a satellite-based solution, capable of transmitting BFT information.

Conclusion

While developing, maintaining and modernizing a comprehensive suite of interoperable C4ISR systems remains a challenge, the Coast Guard's past and ongoing efforts have yielded significant results. Shore, surface and aviation assets now employ state-of-the-market C4ISR systems that support the exchange of Common Operational Picture (COP) information, extend the range and reliability of voice communications and data transmission, and provide operational commanders and senior decision-makers with the mission-critical information necessary to identify threats and coordinate operations. New information gathering, display and dissemination efforts, such as development of Coast Guard One View (CG1V) and deployment of Seawatch on our cutters, represent the next generation of Coast Guard C4ISR systems and will further increase our operational efficiency and mission effectiveness.

Thank you for the opportunity to testify today, and for your continued support of the U.S. Coast Guard. I look forward to answering any questions you may have.

Question#:	1
Topic:	safety zones
Hearing:	How to Improve the Efficiency, Safety, and Security of Maritime Transportation: Better Use and Integration of Maritime Domain Awareness Data
Primary:	The Honorable John Garamendi
Committee:	TRANSPORTATION (HOUSE)
Witness:	Rear Admiral Mark Butt – USCG Assistant Commandant for Capability
Organization:	U.S. Department of Homeland Security

Question: The United States Coast Guard in February 2013 finalized an Interim Final Rule to establish safety zones around grain terminals along the Columbia and Willamette Rivers in Washington and Oregon. These safety zones were established to ensure that protest activities relating to an ongoing labor dispute involving these facilities do not create hazardous navigation conditions for vessels in the navigable channel or vessels attempting to moor at the facilities. As promulgated, these safety zones extended to the waters of the Columbia and Willamette Rivers, respectively, approximately to the midpoint between the navigable channels and the different grain terminal facilities involved in the dispute.

The term of the initial rule expired on June 1, 2013. It is my understanding, however, that the Coast Guard recently reinstated these safety zones but chose not to reinstate the pre-existing safety zones; rather, the Coast Guard decided to alter these zones to expand their areal coverage and to make them significantly more restrictive to protest vessels. I request prompt responses to the following questions regarding the process and manner in which the Coast Guard reinstated these zones:

Please detail the typical procedures the Coast Guard undertakes when proposing rules to establish safety zones.

Response: In rulemakings, the Coast Guard complies with the Administrative Procedure Act, the Regulatory Flexibility Act of 1980, Executive Orders 12866 and 13563, regulations in 33 CFR Part 165, and numerous other statutes, regulations, and executive orders.

Here, the Coast Guard issued temporary interim rules with requests for comment concerning safety zones around certain grain facilities, grain shipment vessels, and grain shipment assist vessels in Oregon and Washington on January 30, 2013 (78 FR 6209), February 4, 2013 (78 FR 7665), June 4, 2013 (78 FR 33224), and August 6, 2013 (78 FR 47567). In each of those rules, the Coast Guard explained the need for the rule and why the rule was issued without prior notice and opportunity for public comment. The first rule, pertaining to grain shipment vessels, was effective until April 26, 2013. The second, pertaining to grain facilities, was effective until June 1, 2013. The third,

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pertaining to grain shipment assist vessels, is effective until September 3, 2013. The fourth, which reestablished safety zones around four grain facilities and established a new safety zone around a fifth facility, is effective until November 4, 2013.

There is some confusion regarding these safety zone rulemakings and their impacts. The June 4 rule did not “expand” the area of the vessel safety zones promulgated in January 2013. The safety zone distances for grain-shipment vessels remain unchanged (500 yards ahead of the vessel, and 200 yards abeam and astern). Instead, the June 4 rule carved out a smaller class of vessels – “grain-shipment assist vessels” – from the definition of the larger group of grain-shipment vessels. *Shorter* safety zone distances were assigned to these smaller vessels (100 yards ahead, 50 yards abeam and astern). The Coast Guard made this change because the existing 500/200 yard safety zone was disproportionately large for these smaller vessels, and it was not the intent of the Coast Guard to enforce that size safety zone around them. Under the June 4 rule, protestors may come *closer* to grain-shipment assist vessels than under the rule published in January 2013. Unfortunately, the optics of establishing a new category of vessels in the regulation text, along with new enforcement of the grain-shipment assist vessel safety zones, gave the appearance of “expanding” the safety zone applicability when that was not the case.

Similarly, a comparison of the February and August rules (facilities) shows that the safety zones established by the latter are far from being significantly more restrictive – instead, the reestablished zones are essentially the same. The original safety zones around the Columbia Grain, United Grain, Temco Kalama, and Temco Portland facilities extended approximately 150 yards onto the river from each corner of the facility, and the reestablished zones for those facilities extend approximately the same distance, although there have been some minor corrections of geographical coordinates. The new safety zone established around Louis Dreyfus Commodities facility extends approximately 70 to 100 yards onto the river from each corner of the facility. As discussed in the August rule, the size of these safety zones is necessary to protect vessels in the area from collision and is based in part on the large size and limited maneuverability of grain shipment vessels.

Question: Was this process followed when the Coast Guard established the expanded safety zones on the Columbia and Willamette Rivers?

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Witness:	Rear Admiral Mark Butt – USCG Assistant Commandant for Capability
Organization:	U.S. Department of Homeland Security

Response: Yes, the Coast Guard complied with all of the authorities listed in the response to the previous question. As described above, the safety zones established by the August rule did not expand the zones in the February rule except to add a zone around the Louis Dreyfus Commodities facility.

Question: Is it typical for the Coast Guard to issue or reissue an interim rule without giving any justification for subsequent changes in the content of the rule?

Response: No. As described above, the August rule discussed the need and justification for the safety zones. The same rule also addressed the differences between the zones established by that rule and the previous facility zones, which were to add a fifth zone around a grain facility and make minor corrections to geographical coordinates.

Question: What specific maritime domain awareness data or marine casualties for either waterway can you provide to substantiate major safety or security issues that have occurred during the duration of the Interim Final Rule that would necessitate or justify an expansion and scope of the safety zones ?

Response: As discussed in response to Question One, the July and August rules did not expand the distance or scope of the safety zones, with the exception of adding an additional facility within the facilities rule (the reasoning for that inclusion is discussed in that response).

As for grain-shipment assist vessels, Coast Guard on-water observations of navigational risks support the Coast Guard's decision to keep them within the safety zone, to reduce the risk of collision. River and bar pilots have raised safety concerns with navigating near vessels involved in protest activity. The pilots are extremely knowledgeable about the unique hazards of navigating on the river and the maneuvering characteristics of deep-draft bulk carriers and assist vessels such as towing vessels and pilot boats. Additionally, there have been two cases where vessel operators failed to heed multiple warnings and violated the safety zone by maneuvering in front of grain-shipment vessels, placing themselves, and potentially the grain-shipment vessels, in danger.

The IR is intended to ensure that members of the maritime public, those participating in protest activities on the water, law enforcement personnel, and vessel crews are not injured. Recreational boating, fishing, and protest activity afloat in these safety zones is

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particularly hazardous because of the effects of strong river currents, the maneuvering characteristics of grain-shipment vessels, and the safety sensitive mid-stream personnel transfers conducted by grain-shipment assist vessels with which recreational boaters and protesters may be unfamiliar. Both grain-shipment vessels and grain-shipment assist vessels require sufficient room for maneuverability, to avoid collisions and minimize and mitigate other navigational risks. These vessels cannot stop immediately or make the sharp course adjustments that smaller motor vessels – such as recreational boats – can make.

With respect to the facility safety zone, the labor dispute expanded to another facility in early 2013 and the zone was amended to include that facility.

Question#:	2
Topic:	labor dispute 1
Hearing:	How to Improve the Efficiency, Safety, and Security of Maritime Transportation: Better Use and Integration of Maritime Domain Awareness Data
Primary:	The Honorable John Garamendi
Committee:	TRANSPORTATION (HOUSE)

Question: The Coast Guard has stated that its only interest during the ongoing labor dispute is to maintain navigation safety on each waterway.

Please detail the specific administrative procedures the Coast Guard implemented to ensure its neutrality when it initially established these safety zones.

Response: On October 10, prior to implementing these safety zones, the Captain of the Port met with ILWU leaders to discuss their picketing needs and the on-water picket areas suggested by the COTP. The COTP's neutrality in promulgating these rules is imbedded in its Incident Action Plan (IAP) operational objectives:

1. Ensure the Maritime Transportation System (MTS) remains open to legitimate use by all users, including the lawful exercise of citizen's first amendment rights;
2. Promote and facilitate the safety of all legitimate waterway users to include commercial and recreational vessels, lawful on-water protestors, and response personnel;
3. Ensure regulated maritime facilities are enforcing their Facility Security Plans; and
4. Prevent activities that increase risk to the environment.

Question: Were these same administrative procedures followed when the revised safety zones were reinstated?

Response: Yes. The IAP remains in effect. In addition, when the Coast Guard revised the safety zones, it changed the rule from a temporary final rule to a temporary interim rule, inviting public comment on the record.

Question#:	3
Topic:	labor dispute 2
Hearing:	How to Improve the Efficiency, Safety, and Security of Maritime Transportation: Better Use and Integration of Maritime Domain Awareness Data
Primary:	The Honorable John Garamendi
Committee:	TRANSPORTATION (HOUSE)

Question: Despite the Coast Guard's stated neutrality in this labor dispute, in 2012 the Coast Guard's Columbia River Sector Enforcement Chief sent an e-mail message to a local Sheriff congratulating him on the arrest of the International Longshore and Warehouse Union (ILWU) President. Such communication expresses a clear bias on the part of at least one Coast Guard official.

What specific disciplinary actions were taken by the Coast Guard to reprimand this individual and to address this incident?

Response: Despite the fact that there are no prior or subsequent written or verbal statements that could be construed as one-sided by the Coast Guard; the member was appropriately counseled by his supervisors, including the COTP, on 21 Dec 2012.

Question: What actions to date has the Coast Guard taken to restore its neutrality in this dispute?

Response: The Coast Guard has remained neutral throughout the dispute and the COTP's neutrality is imbedded in its Incident Action Plan (IAP) operational objectives:

1. Ensure the Maritime Transportation System (MTS) remains open to legitimate use by all users, including the lawful exercise of citizens' first amendment rights.
2. Promote and facilitate the safety of all legitimate waterway users to include commercial and recreational vessels, lawful on-water protestors, and response personnel.
3. Ensure regulated maritime facilities are enforcing their Facility Security Plans.
4. Prevent activities that increase risk to the environment.

Additionally, Sector Columbia River and Marine Safety Unit (MSU) Portland embedded media during a Coast Guard patrol to observe and report on possible on-water protest activity. Coverage may be found at:
http://www.oregonlive.com/business/index.ssf/2013/05/coast_guard_referees_as_longsh.html.

Question#:	4
Topic:	revised safety zones
Hearing:	How to Improve the Efficiency, Safety, and Security of Maritime Transportation: Better Use and Integration of Maritime Domain Awareness Data
Primary:	The Honorable John Garamendi
Committee:	TRANSPORTATION (HOUSE)

Question: I am concerned that the Coast Guard did not solicit adequate input prior to the reinstatement of the revised safety zones. Please provide an account of all meetings in 2013 (date, time, location, participants in attendance, etc.) convened by the Coast Guard to specifically solicit public comment on the expanded safety zones from the following:

- Meetings with local stakeholder interests (pilots, tug/barge operators, recreational boaters, etc.);
- Meetings with respective state officials;
- Meetings with local law enforcement representatives; and
- Meetings with representatives from the ILWU and whether the Coast Guard discussed how the expanded safety zones would affect protest activities initiated by the union.

Response: These rules were published with instructions for requesting a Public Meeting for comment on the safety zones. None has been requested and all public comment has occurred on the Docket. There have been several informational meetings in which the rule has been described to members of the maritime community, but not to solicit public comment.

Industry Breakfasts are held on board MSU Portland on the third Thursday of each month. These meetings are open to the entire maritime community, including ILWU representatives. Similarly, informational briefs were provided at the Harbor Safety Committee Meeting, in Longview, WA, on 8 May 13.

16 May 13: Sector Columbia River contacted ILWU Local 4 President Mr. Cager Clabaugh; ILWU Local 8 Secretary Mr. John Michan; and ILWU Local 21 President Mr. Jake Whiteside.

18 Jul 13: Area Maritime Security Meeting - attendance included ILWU Local-8 representative and the General Manager/Facility Security Officer from Columbia Grain.

26 Jul 13: Sector Columbia River staff called ILWU Local 8 (and also called to ILWU Local 4 with no answer) to check in and solicit input regarding the safety zone.

Question#:	5
Topic:	private security firm
Hearing:	How to Improve the Efficiency, Safety, and Security of Maritime Transportation: Better Use and Integration of Maritime Domain Awareness Data
Primary:	The Honorable John Garamendi
Committee:	TRANSPORTATION (HOUSE)

Question: It is my understanding that the Coast Guard met with representatives from a private security firm, JR Gettier, to discuss these safety zones. The headquarters for this firm is located in Wilmington, Delaware.

Please provide a list of all meetings (date, time, location, participants in attendance, etc.) between Coast Guard officials and representatives from JR Gettier to discuss these safety zones, including all meetings prior to the issuance of the Interim Final Rule.

Response: On 13 Sep 12, J.R. Gettier invited local/state/federal law enforcement agencies, including the Coast Guard, to a meeting to introduce themselves and explain that their company had been contracted to provide security for the grain facility. The grain facility is a 33 C.F.R. 105 regulated facility. The Coast Guard attended to ensure the facility complied with its facility security plan.

28 Sep 12: Coast Guard held two separate meetings to gain understanding of the developing labor dispute, before the occurrence. The first was with ILWU representatives from the local area affiliated and ILWU committees. The second was with grain facility managers and local/state/federal law enforcement officials. Representatives from J.R. Gettier were present at the meeting on behalf of the grain facilities.

05 Oct 12: Coast Guard held a meeting with Columbia River Pilots Association to discuss safety zones and pilotage concerns. A representative from J.R. Gettier was present on behalf of the Pilots Association.

Question: Is it common for the Coast Guard to consult with private security firms while it is promulgating a rule for the establishment of a safety zone for a maritime event; for example, for this summer's America's Cup races in San Francisco Bay or other similar special events?

Response: The Coast Guard does not consult with private security firms while promulgating safety zones. In this case, the Coast Guard met with a grain facility to discuss proposed updates to and ensure compliance with its facility security plan under 33 C.F.R. 105. J.R. Gettier was contracted by private parties to provide security and was present at several meetings on behalf of their clients.

Question#:	5
Topic:	private security firm
Hearing:	How to Improve the Efficiency, Safety, and Security of Maritime Transportation: Better Use and Integration of Maritime Domain Awareness Data
Primary:	The Honorable John Garamendi
Committee:	TRANSPORTATION (HOUSE)

Question: Why did the Coast Guard select a private security firm located in Delaware to consult with concerning a waterway safety matter affecting grain terminals in the Pacific Northwest?

Response: The Coast Guard did not select a private security firm to consult with regarding waterway safety matters. In this case, the Coast Guard met with a grain facility to discuss proposed updates to and ensure compliance with its facility security plan under 33 C.F.R. 105. J.R. Gettier was contracted by private parties to provide security and was present at several meetings on behalf of their clients.



United States Government Accountability Office

Testimony

Before the Subcommittee on Coast Guard
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Committee on Transportation and
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COAST GUARD

Observations on Progress Made and Challenges Faced in Developing and Implementing a Common Operational Picture

Statement of Stephen L. Caldwell, Director
Homeland Security and Justice Issues

GAO Highlights

Highlights of GAO-13-784T, a testimony before the Subcommittee on Coast Guard and Maritime Transportation, Committee on Transportation and Infrastructure, House of Representatives

Why GAO Did This Study

To facilitate its mission effectiveness through greater maritime situational awareness, the Coast Guard developed its COP—a map-based information system shared among its commands. The COP displays vessels, information about those vessels, and the environment surrounding them on interactive digital maps. COP information is shared via computer networks throughout the Coast Guard to assist with operational decisions. COP-related systems include systems that can be used to access, or provide information to, the COP.

This statement summarizes GAO's work on (1) the Coast Guard's progress in increasing the availability of data sources and COP information to users and (2) the challenges the Coast Guard has experienced in developing and implementing COP-related systems. This statement is based on GAO's prior work issued from July 2011 through April 2013 on various Coast Guard acquisition and implementation efforts related to the COP, along with selected updates conducted in July 2013. To conduct the selected updates, GAO obtained documentation on the Coast Guard's reported status in developing COP-related acquisition planning documents.

What GAO Recommends

GAO has made recommendations in prior work to enhance the Coast Guard's development and implementation of its COP-related systems. DHS generally concurred with the recommendations and has reported actions under way to address them.

View GAO-13-784T. For more information, contact Stephen L. Caldwell at (202) 512-9610 or caldwells@gao.gov.

July 31, 2013

COAST GUARD

Observations on Progress Made and Challenges Faced in Developing and Implementing a Common Operational Picture

What GAO Found

The Coast Guard, a component of the Department of Homeland Security (DHS), has made progress in developing its Common Operational Picture (COP) by increasing the information in the COP and increasing user access to this information. The Coast Guard has made progress by adding internal and external data sources that allow for better understanding of anything associated with the global maritime domain that could affect the United States. The COP has made information from these sources available to more COP users and decision makers throughout the Coast Guard. For example, in 2006, the ability to track the location of Coast Guard assets, including small boats and cutters, was added to the COP. This capability—also known as blue force tracking—allows COP users to locate Coast Guard vessels in real time and establish which vessels are in the best position to respond to mission needs. In addition to adding information to the COP, the Coast Guard has also made the information contained in the COP available on more computers and on more systems, which, in turn, has increased the number of users with access to the COP.

The Coast Guard has also experienced challenges in developing and implementing COP-related systems and meeting the COP's goals for implementing systems to display and share COP information. These challenges have affected the Coast Guard's deployment of recent COP technology acquisitions and are related to such things as the inability to share information as intended and systems not meeting intended objectives. For example, in July 2011, GAO reported that the Coast Guard had not met its goal of building a single, fully interoperable Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance program (C4ISR) system—a \$2.5 billion project intended to enable the sharing of COP and other data among its new offshore vessels and aircraft. Specifically, GAO noted that the Coast Guard: (1) repeatedly changed its strategy for achieving the goal of the C4ISR system and (2) that not all vessels and aircraft were operating the same C4ISR system, or even at the same classification level and hence could not directly exchange data with one another as intended. GAO found similar challenges with other Coast Guard COP-related systems not meeting intended objectives. For example, in February 2012, GAO reported that the intended information-sharing capabilities of the Coast Guard's WatchKeeper software—a major part of the \$74 million Interagency Operations Center project designed to gather data to help port partner agencies collaborate in the conduct of operations and share information, among other things—met few port agency partner needs, in part because the agency failed to determine these needs when developing the system. Further, in April 2013, GAO reported that, among other things, the Coast Guard experienced challenges when it deployed its Enterprise Geographic Information System (EGIS), a tool for viewing COP information that did not meet user needs. The challenges Coast Guard personnel experienced with EGIS included system slowness and displays of inaccurate information.

Chairman Hunter, Ranking Member Garamendi, and Members of the Subcommittee:

Thank you for the opportunity to discuss the status of the Coast Guard's progress in developing a Common Operational Picture (COP), and the challenges the agency has faced in managing this effort. As you know, maritime domain awareness (MDA)—which involves the effective understanding of anything in the maritime environment that could impact the security, safety, economy or environment of the United States—is critical to the Coast Guard's mission efforts. According to the Coast Guard, MDA played a key role in 2011 as it interdicted over 100 tons of narcotics, intercepted over 2,400 alien migrants, detained over 190 suspected smugglers, boarded over 100 foreign vessels to suppress illegal fishing, and rescued over 3,800 persons.

To enhance its situational awareness, the Coast Guard operates within a complex information-sharing network with its maritime partners. Specifically, as the lead agency in the Department of Homeland Security (DHS) for maintaining and improving MDA efforts, the Coast Guard works with its partners to facilitate the sharing and dissemination of a wide array of information and intelligence to secure the nation's maritime transportation system against potential threats. The level of information sharing among these partners is largely dependent on the information source and classification level. For example, the Coast Guard works directly with the Navy as a major part of its defense readiness mission. However, since the Navy's command and control system operates at the classified level, the Coast Guard must also be able to share information at the classified level. Similarly, because many of its mission-related interagency activities are with other federal, state, and local government agencies, as well as the private sector, the Coast Guard must also be able to communicate and share information at the unclassified level. As a result, the Coast Guard operates in both the classified and unclassified environment.¹

To facilitate this information sharing for mission effectiveness and situational awareness with all of its partners, in 1998 the Coast Guard

¹ While the Department of Defense-managed classified COP provides important information for Coast Guard maritime operations, over the last 10 years, the Coast Guard has been building its unclassified COP for its personnel, other federal agencies, and non-federal partners.

began developing its COP—an interactive map-based information system that can be shared among Coast Guard commands—that displays vessels and information about those vessels and the environment surrounding them. In general, the Coast Guard's COP can be described as an information display that provides the position and additional information on vessel and aircraft contacts (called tracks) to the Coast Guard and other decision makers. The Coast Guard's concept for the COP includes a complex interplay of data, assets, technology, and multiple organizations at multiple security levels helping to populate and share information within the COP. The COP can be a stand-alone presentation or part of mission-oriented Geographic Information System (GIS) displays that are linked to information sources.² COP-related systems include systems that can be used to access, or provide information, to the COP.

My statement today is based on our prior work issued from July 2011 through April 2013 on the Coast Guard's implementation of COP-related systems, and the challenges the Coast Guard has encountered in acquiring and implementing these systems, including selected updates conducted in July 2013 related to the Coast Guard's acquisition strategy of COP-related systems. This statement discusses (1) the Coast Guard's progress in increasing data sources and the availability of COP information to users and (2) the challenges the Coast Guard has experienced in developing and implementing COP-related systems. For our previous reports we analyzed Coast Guard documentation, such as pertinent provisions of the Coast Guard's Common Operational Picture Concept of Operations, and interviewed Coast Guard officials, including headquarters officials responsible for managing the COP's development and requirements and field personnel who use the COP. More detailed information on our scope and methodology appears in our published work.³ For the selected updates, we obtained documentation on the

² Specifically, a GIS is an integrated collection of computer software and data used to view and manage information about geographic places, analyze spatial relationships, and model spatial processes, in order to share information related to the people, vessels, and facilities in a mapped display.

³ See GAO, Coast Guard: *Clarifying the Application of Guidance for Common Operational Picture Development Would Strengthen Program*. GAO-13-321 (Washington, D.C.: April 25, 2013); GAO, Maritime Security: *Coast Guard Needs to Improve Use and Management of Interagency Operations Centers*. GAO-12-202 (Washington, D.C.: February 13, 2012); and GAO, Coast Guard: *Action Needed As Approved Deepwater Program Remains Unachievable*. GAO-11-743 (Washington, D.C.: July 28, 2011).

Coast Guard's reported status in developing acquisition planning and technical documents for COP-related systems. All of our work was conducted in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

According to the Coast Guard, the COP became operational in 2003 and is comprised of four elements:

- **Track data feeds:** The primary information included in the Coast Guard's COP is vessel and aircraft position information—or tracks—and descriptive information about the vessels, their cargo, and crew. Track information may be obtained from a variety of sources depending on the type of track. For example, the COP includes track information or position reports of Coast Guard and port partner vessels.
- **Information data sources:** The information data sources provide supplementary information on the vessel tracks to help COP users and operational commanders determine why a track might be important. The COP includes data from multiple information sources that originate from the Coast Guard as well as from other government agencies and civilian sources.⁴

⁴ Internal sources include intelligence inputs and Coast Guard databases such as the Marine Information for Safety and Law Enforcement (MISLE) and the Ship Arrival Notification System (SANS), among others. MISLE collects, stores, and disseminates data on vessels, cargo facilities, waterways, and parties (both individuals and organizations), as well as Coast Guard activities involving all of these entities. MISLE activities include law enforcement boardings, vessel sightings, marine inspections, marine safety investigations, response actions, search and rescue operations, operational controls, and enforcement actions. The SANS is a Coast Guard database populated with Notice of Arrival information that vessels are required to submit 96 hours prior to entering U.S. territorial waters. Coast Guard command centers can access this database to gather vessel, crew, cargo, and company information concerning ships entering their area of responsibility. External sources include the Department of Defense and the National Oceanic and Atmospheric Administration.

-
- **Command and control systems:** These systems collect, fuse, disseminate, and store information for the COP. Since the COP became operational in 2003, the Coast Guard has provided COP users with various systems that have allowed them to view, manipulate and enhance their use of the COP. These systems have included the Global Command and Control System (GCCS), Command and Control Personal Computer (C2PC), and Hawkeye.⁵ In addition to the technology needed to view the COP, the Coast Guard has also developed technology to further enhance the information within the COP and its use to improve mission effectiveness. This has occurred in part through its former Deepwater⁶ Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) program system improvements.⁷
 - **COP management procedures:** These procedures address the development and the use of the COP. This would include, for example, the Concept of Operations document, which identifies the basic components, use, and exchange of information included in the COP and the requirements document, which identifies the essential capabilities and associated requirements needed to make the COP

⁵ C2PC is a Microsoft Windows-based system implemented in 2004 that displays the COP from a GCCS-based server that allows users to view near real-time situational awareness. Hawkeye is a system implemented in 2005 that monitors and tracks commercial vessels on the coast and in port areas using radar, cameras, and Automatic Identification System (AIS) sensors. AIS equipment transmits information such as the name of the vessel, its position, speed, course, and destination to receivers within range of its broadcast, allowing these vessels to be tracked. GCCS is a system developed in 2003 that provides commanders a single, integrated, scalable command and control system that fuses, correlates, filters, maintains and displays location and attribute information on friendly, hostile and neutral forces. It integrates this data with available intelligence and environmental information in support of command decision making.

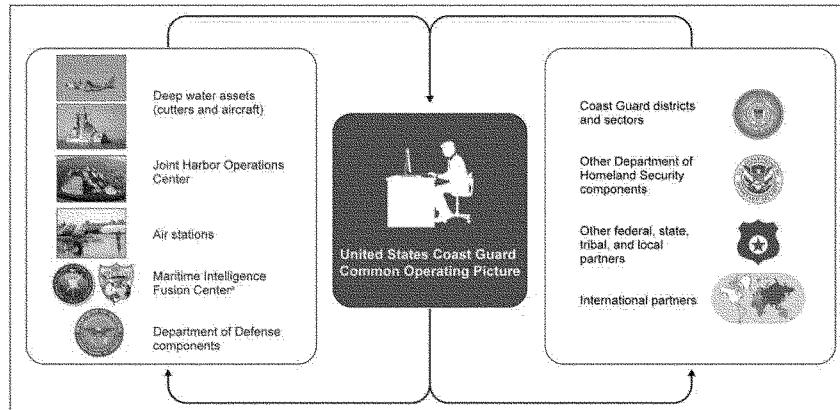
⁶ The Coast Guard's acquisition program aimed at recapitalizing its surface, air, and information technology capacity (formerly known as Deepwater) is an integrated effort to replace or modernize the agency's aging vessels and aircraft assets that are used for missions beyond 50 miles from shore.

⁷ C4ISR is the systems, procedures, and techniques used to collect and disseminate information. This includes intelligence collection and dissemination networks, command and control networks, and systems that provide the common operational/tactical picture. C4ISR also includes information assurance products and services, as well as communications standards that support the secure exchange of information by C4ISR systems (digital, voice, and video data to appropriate levels of command). This technology acquisition was intended to create an interoperable network of sensors, computer systems, and hardware to improve MDA.

function. These procedures also include other documents such as standard operating procedures on how the Coast Guard uses the COP, agreements with others using the COP on how information is to be shared or exchanged, and rules for how data are correlated and how vessels are flagged as threats or friends.

Figure 1 depicts the Coast Guard's vision of the COP with Coast Guard internal and external users.

Figure 1: The Coast Guard's Vision of the Common Operational Picture



Source: Coast Guard (photos and logos); DHS (logo); DOD (logo); Map Resources (map); Art Explosion (clip art).

*The Coast Guard's two Maritime Intelligence Fusion Centers serve as the central hubs for fusion, analysis, and dissemination of maritime intelligence and information at the operational and tactical level.

The Coast Guard Has Made Progress in Adding Data Sources and the Availability of COP Information to Users

In April 2013, we reported that since the COP became operational in 2003, the Coast Guard has made progress in adding useful data sources and in increasing the number of users with access to the COP.⁸ In general, the COP has added internal and external data sources and types of vessel-tracking information that enhance COP users' knowledge of the maritime domain. Vessel tracking information had been available previously to Coast Guard field units located in ports through a Vessel Tracking Service—that is, a service that provides active monitoring and navigational advice for vessels in confined and busy waterways to help facilitate maritime safety.⁹ However, adding it to the COP provided a broader base of situational awareness for Coast Guard operational commanders. For example, before automatic identification system (AIS)¹⁰ vessel-tracking information was added to the COP, only Coast Guard units specifically responsible for vessel-tracking, were able to easily track large commercial vessels' positions, speeds, courses, and destinations. According to Coast Guard personnel, after AIS data were added to the COP in 2003, any Coast Guard unit could access such information to improve strategic and tactical decision making. In 2006, the ability to track the location of Coast Guard assets, including small boats and cutters, was also added to the COP. This capability—also known as blue force tracking—allows COP users to locate Coast Guard vessels in real time and establish which vessels are in the best position to respond to mission needs. Similarly, blue force tracking allows the Coast Guard to differentiate its own vessels from commercial or unfriendly vessels.

Another enhancement to the information available in the COP was provided through the updating of certain equipment on Coast Guard assets that enabled them to collect and transmit data. Specifically, the Coast Guard made some data collection and sharing improvements, including the installation of commercial satellite communications

⁸ GAO-13-321.

⁹ Vessel Tracking Services provide active monitoring and navigational advice for vessels in confined and busy waterways to help facilitate maritime safety.

¹⁰ The Maritime Transportation Security Act of 2002 mandates that most large commercial vessels operate an AIS while in U.S. waters. 46 U.S.C. § 70114. On board vessels, AIS equipment transmits information such as the name of the vessel, its position, speed, course, and destination to receivers within range of its broadcast, allowing these vessels to be tracked when they are operating in coastal areas, on inland waterways, and in ports. Receivers may be installed on other vessels, land stations, or other locations. Coast Guard personnel monitor screens transmitting information on the tracked vessels.

equipment and AIS receivers, onboard its older cutters. This added capability made the COP information more robust by allowing Coast Guard vessels at sea to receive, through AIS receivers, position reports from large commercial vessels and then transmit this information to land units where it would be entered into the COP. This equipment upgrade on older Coast Guard cutters added information into the COP that is generally not available through other means.

According to Coast Guard officials, in addition to adding information to the COP, the Coast Guard has also made the information contained in the COP available on more computers and on more systems, which, in turn, has increased the number of users with access to the COP. One of the key steps toward increasing the number of users with COP access occurred in 2004 with the implementation of C2PC, which made both the classified and unclassified COP available to additional Coast Guard personnel. According to Coast Guard officials, the advent of C2PC allowed access to the COP from any Coast Guard computer connected to the Coast Guard data network. Prior to C2PC, Coast Guard personnel had access to the COP through Coast Guard GCCS workstations.

The Coast Guard Has Experienced Challenges in Developing and Implementing COP-related Systems

We previously reported that the Coast Guard has experienced challenges with COP-related technology acquisitions that resulted from the Coast Guard not following its own information technology acquisition guidance and processes. These challenges included poor usability and the inability to share information as intended, and ultimately resulted in the Coast Guard not meeting its goals for multiple COP-related systems. For example, four COP-related systems have been affected by the Coast Guard not closely following its acquisition processes.

C4ISR project. The C4ISR project was designed to allow the Coast Guard's newly acquired offshore vessels and aircraft to both add information to the COP using their own sensors as well as view information contained within the COP, thereby allowing these assets to become both producers and consumers of COP information.¹¹ However, in July 2011, we reported that the Coast Guard had not met its goal of

¹¹ In July 2011, we reported that the Coast Guard was developing C4ISR infrastructure that it expected to collect, correlate, and present information into a single COP to facilitate mission execution. See GAO-11-743.

building the \$2.5 billion C4ISR system.¹² Specifically, we reported that the Coast Guard had repeatedly changed its strategy for achieving C4ISR's goal of building a single fully interoperable command, control, intelligence, surveillance, and reconnaissance system across the Coast Guard's new vessels and aircraft. Further, we found that not all aircraft and vessels were operating the same C4ISR system, or even at the same classification level, and hence could not directly exchange data with each other. For example, an aircraft operating with a classified system had difficulty sharing information with others operating on unclassified systems during the Deepwater Horizon oil spill incident. In addition, we reported at that time that the Coast Guard may shift away from a full data-sharing capability and instead use a system where shore-based command centers serve as conduits between assets while also entering data from assets into the COP. This approach could increase the time it takes for COP information, for example, gathered by a vessel operating with a classified system to be shared with an aircraft operating with an unclassified system. Because aircraft and vessels are important contributors to and users of COP information, a limited capability to quickly and fully share COP data could affect their mission effectiveness. We concluded that given these uncertainties, the Coast Guard did not have a clear vision of the C4ISR required to meet its missions.

We also reported in July 2011 that the Coast Guard was managing the C4ISR program without key acquisition documents. At that time, the Coast Guard lacked an acquisition program baseline that reflected the planned program, a credible life-cycle cost estimate, and an operational requirements document for the entire C4ISR acquisition project. According to Coast Guard information technology officials, the abundance of software baselines could increase the overall instability of the C4ISR system and complexity of the data sharing among assets. We recommended, and the Coast Guard concurred, that it should determine whether the system-of-systems concept¹³ for C4ISR is still the planned vision for the program, and if not, ensure that the new vision is comprehensively detailed in the project documentation. In response to our recommendation, the Coast Guard reported in 2012 that it was still supporting the system-of-systems approach, and was developing needed

¹² GAO-11-743.

¹³ A system-of-systems is a set or arrangement of assets that results when independent assets are integrated into a larger system that delivers unique capabilities.

documentation. We will continue to assess the C4ISR program through our ongoing work on Coast Guard recapitalization efforts.

Development of WatchKeeper. Another mechanism that was expected to increase access to COP information was the DHS Interagency Operations Center (IOC) program, which was delegated to the Coast Guard for development.¹⁴ This \$74 million program began providing COP information to Coast Guard agency partners in 2010 using WatchKeeper software. The IOCs were originally designed to gather data from sensors and port partner sources to provide situational awareness to Coast Guard sector¹⁵ personnel and to Coast Guard partners in state and local law enforcement and port operations, among others. Specifically, WatchKeeper was designed to provide Coast Guard personnel and port partners with access to the same unclassified GIS data, thereby improving collaboration between them and leveraging their respective capabilities in responding to cases. For example, in responding to a distress call, access to WatchKeeper information would allow both the Coast Guard unit and its local port partners to know the location of all possible response vessels, so they could allocate resources and develop search patterns that made the best use of each responding vessel.

In February 2012, we reported that the Coast Guard had increased access to its WatchKeeper software by allowing access to the system for Coast Guard port partners.¹⁶ However, the Coast Guard had limited success in improving information sharing between the Coast Guard and

¹⁴ IOCs are facilities and systems designed to help port agencies collaborate in the conduct of operations; collaborate and jointly plan operations; share targeting, intelligence and scheduling information; developing real-time awareness, evaluate threats, and deploy resources; and minimize the economic impact from any disruption. In July 2007, the DHS Assistant Secretary for Legislative Affairs reported to Congress that the Coast Guard's acquisition project Command 21—later named the Interagency Operations Centers (IOC) project—would meet the Safety and Accountability For Every Port Act of 2006 (SAFE Port Act) provision that requires the establishment of IOCs. The SAFE Port Act requires IOCs to be incorporated in the implementation and administration of, among other things, maritime intelligence activities, information sharing, and short and long-range vessel tracking. Pub. L. No. 109-347, 120 Stat. 1884, 1892-93 (2006).

¹⁵ Coast Guard sectors run all Coast Guard missions at the local and port level, such as search and rescue, port security, environmental protection, and law enforcement in ports and surrounding waters, and oversee a number of smaller Coast Guard units, including small cutters, small boat stations, and Aids to Navigation teams.

¹⁶ GAO-12-202.

local port partners and did not follow its established guidance during the development of WatchKeeper—a major component of the \$74 million Interagency Operations Center acquisition project. By not following its guidance, the Coast Guard failed to determine the needs of its users, define acquisition requirements, or determine cost and schedule information. Specifically, prior to the initial deployment of WatchKeeper, the Coast Guard had made limited efforts to determine port partner needs for the system. For example, we found that Coast Guard officials had some high level discussions, primarily with other DHS partners, but that port partner involvement in the development of WatchKeeper requirements was primarily limited to Customs and Border Protection because WatchKeeper had grown out of a system designed for screening commercial vessel arrivals—a Customs and Border Protection mission. However, according to the *Interagency Operations Process Report: Mapping Process to Requirements for Interagency Operations Centers*, the Coast Guard identified many port partners as critical to IOCs, including other federal agencies (e.g., the Federal Bureau of Investigation) and state and local agencies.

We also determined that because few port partners' needs were met with WatchKeeper, use of the system by port partners was limited. Specifically, of the 233 port partners who had access to WatchKeeper for any part of September 2011 (the most recent month for which data were available at the time of our report), about 18 percent had ever logged onto the system and about 3 percent had logged on more than five times. Additionally, we reported that without implementing a documented process to obtain and incorporate port partner feedback into the development of future WatchKeeper requirements, the Coast Guard was at risk of deploying a system that lacked needed capabilities, which would continue to limit the ability of port partners to share information and coordinate in the maritime environment. We concluded, in part, that the weak management of the IOC acquisition project increased the program's exposure to risk. In particular, fundamental requirements-development and management practices had not been employed; costs were unclear; and the project's schedule, which was to guide program execution and promote accountability, had not been reliably derived. Moreover, we reported that with stronger program management, the Coast Guard could reduce the risk that it would have a system that did not meet Coast Guard and port partner user needs and expectations. As a result, we recommended, and the Coast Guard concurred, that it collect data to determine the extent to which (1) sectors are providing port partners with WatchKeeper access and (2) port partners are using WatchKeeper; then develop, document, and implement a process to obtain and incorporate

port-partner input into the development of future WatchKeeper requirements; and define, document, and prioritize WatchKeeper requirements. As of April 2013, we had not received any reports of progress on these recommendations from the Coast Guard.

Coast Guard Enterprise Geographic Information System (EGIS). In April 2013, we also reported that Coast Guard personnel we interviewed who use EGIS—an important component, along with its associated viewer, for accessing COP information—stated that they had experienced numerous challenges with the system after it was implemented in 2009.¹⁷ Our site visits to area, district, and sector command centers in six Coast Guard field locations, and discussions with headquarters personnel, identified numerous examples of user concerns about EGIS.¹⁸ Specifically, the Coast Guard personnel we interviewed who used EGIS stated that it was slow, did not always display accurate and timely information, or degraded the performance of their computer workstations—making EGIS’s performance generally unsatisfactory to them. For example, personnel from one district we visited reported losing critical time when attempting to determine a boater’s position on a map display because of EGIS’s slow performance. Similarly, personnel at three of the five districts we visited described how EGIS sometimes displayed inaccurate or delayed vessel location information, including, for example, displaying a vessel track indicating a 25-foot Coast Guard boat was located off the coast of Greenland—a location where no such vessel had ever been. Personnel we met with in two districts did not use EGIS at all to display COP information because doing so caused other applications to crash.

In addition to user-identified challenges, we reported in April 2013 that Coast Guard information technology (IT) officials told us they had experienced challenges largely related to insufficient computational power

¹⁷ EGIS is a Coast Guard geographic information system used to view and manage information about geographic places, analyze spatial relationships, and model spatial processes. Much of the unclassified information contained in the COP is available through EGIS. EGIS can display this information on multiple viewers. See GAO-13-321.

¹⁸ Command Centers perform three primary functions: command and control, situational awareness, and information management for their area of responsibility. They coordinate activities between operational commanders and assets performing the missions. The specific differences among command centers depend on the primary missions performed by their command.

on some Coast Guard work stations, a lack of training for users and system installers, and inadequate testing of EGIS software before installation. For example, according to Coast Guard IT officials, Coast Guard computers are replaced on a regular schedule, but not all at once, and EGIS's viewer places a high demand on the graphics capabilities of computers. They added that this demand was beyond the capability of the older Coast Guard computers used in some locations. Moreover, Coast Guard IT management made EGIS available to all potential users without performing the tests needed to determine if capability challenges would ensue. In regard to training, Coast Guard officials told us that they had developed online internal training for EGIS, and classroom training was also available from the software supplier. However, Coast Guard IT officials stated that they did not inform users that this training was available. This left the users with learning how to use EGIS on the job. Similarly, the installers of EGIS software were not trained properly, and many cases of incomplete installation were later discovered. These incomplete installations significantly degraded the capabilities of EGIS. Finally, the Coast Guard did not pre-test the demands of EGIS on Coast Guard systems in real world conditions, according to Coast Guard officials. Tests conducted later, after users commented on their problems using EGIS, demonstrated the limitations of the Coast Guard network in handling EGIS. According to Coast Guard officials, some of these challenges may have been avoided if they had followed established acquisition processes for IT development. If these problems had been averted, users may have had greater satisfaction and the system may have been better utilized for Coast Guard mission needs.

Poor communication by, and among, Coast Guard IT officials led to additional management challenges during efforts to implement a simplified EGIS technology called EGIS Silverlight. According to Coast Guard officials, the Coast Guard implemented EGIS Silverlight to give users access to EGIS data without the analysis tools that had been tied to technical challenges with the existing EGIS software. Coast Guard personnel from the Office of the Chief Information Officer (CIO) stated that EGIS Silverlight was available to users in 2010; however, none of the Coast Guard personnel we spoke with at the field units we visited mentioned awareness of or use of this alternative EGIS option when asked about what systems they used to access the COP. According to CIO personnel, it was the responsibility of the system sponsor's office to notify users about the availability of EGIS Silverlight. However, personnel from the sponsor's office stated that they were unaware that EGIS Silverlight had been deployed and thus had not taken steps to notify field personnel of this new application that could have helped to address EGIS

performance problems. These Coast Guard officials were unable to explain how this communication breakdown had occurred.

Coast Guard One View (CG1V). In April 2013, we reported that the Coast Guard had not followed its own information technology development guidance when developing its new COP viewer, known as Coast Guard One View, or CG1V.¹⁹ The Coast Guard reported that it began development of CG1V in April 2010 to provide users with a single interface for viewing GIS information, including the COP, and to align the Coast Guard's viewer with DHS's new GIS viewer.²⁰ However, in 2012, during its initial development of CG1V, the agency did not follow its System Development Life Cycle (SDLC) guidance which requires documents to be completed during specific phases of product development.²¹ Specifically, 9 months after CG1V had entered into the SDLC the Coast Guard either had not created certain required documents or had created them outside of the sequence prescribed by the SDLC. For example, the SDLC-required tailoring plan is supposed to provide a clear and concise listing of SDLC process requirements throughout the entire system lifecycle, and facilitate the documentation of calculated deviations from standard SDLC activities, products, roles, and responsibilities from the outset of the project. Though the SDLC clearly states that the tailoring plan is a key first step in the SDLC, for CG1V it was not written until after documents required in the second phase were completed. Coast Guard officials stated that this late completion of the tailoring plan occurred because the Coast Guard's Chief Information Officer had allowed the project to start in the second phase of the SDLC because they believed CG1V was a proven concept. However, without

¹⁹ GAO-13-321. CG1V is a viewer under development that can be used to display information contained within the COP. It can also be used to receive, correlate, and analyze a variety of information from multiple sources to provide situational awareness. Specifically, these viewers interface with the COP and other systems to visually display data, on a map, to decision makers.

²⁰ Coast Guard officials stated that CG1V development began in 2010 but was delayed for 2 years because of the Coast Guard's response to the Deepwater Horizon oil spill and other unforeseen events that diverted Coast Guard resources.

²¹ In 2004, the Coast Guard implemented the SDLC process for non-major IT acquisitions—those with less than \$300 million dollars in life cycle costs—to help ensure IT projects are managed effectively and meet user needs. The SDLC process has seven major phases: (1) conceptual planning, (2) planning and requirements, (3) design, (4) development and testing, (5) implementation, (6) operations and maintenance activities, and (7) disposition.

key phase one documents, the Coast Guard may have prematurely selected CG1V as a solution without reviewing other viable alternatives to meet its vision, and may have dedicated resources to CG1V without knowing project costs. In October 2012, Coast Guard officials acknowledged the importance of following the SDLC process and stated their intent to complete the SDLC-required documents. Clarifying the application of the SDLC to new technology development would better position the Coast Guard to maximize the usefulness of the COP. In our April 2013 report, we recommended that the Commandant of the Coast Guard direct the Coast Guard Chief Information Officer to issue guidance clarifying the application of the SDLC for the development of future projects. The Coast Guard concurred with the recommendation and reported that it planned to mitigate the risks of potential implementation challenges of future technology developments for the COP by issuing proper guidance and clarifying procedures regarding the applicability of the SDLC. The Coast Guard estimated that it would implement this recommendation by the end of fiscal year 2013.

Chairman Hunter, Ranking Member Garamendi, and Members of the Subcommittee, this completes my prepared statement. I would be happy to respond to any questions.

GAO Contact and Staff Acknowledgments

For questions about this statement, please contact Stephen L. Caldwell at (202) 512-9610 or caldwells@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement. Individuals making key contributions to this statement include Dawn Hoff (Assistant Director), Jonathan Bachman, Jason Berman, Laurier Fish, Bintou Njie, Jessica Orr, Lerone Reid, and Katherine Trimble.

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Liquid Robotics testimony
before the
U.S. House Transportation and
Infrastructure Subcommittee on Coast
Guard and Maritime Transportation

Bill Vass,
CEO, Liquid Robotics

July 31, 2013

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Photo: Underwater view of the Liquid Robotics Wave Glider®



TESTIMONY OF WILLIAM VASS
CEO, LIQUID ROBOTICS
ON
"HOW TO IMPROVE THE EFFICIENCY, SAFETY AND SECURITY OF
MARITIME TRANSPORTATION: BETTER USE AND INTEGRATION
OF MARITIME DOMAIN AWARENESS DATA"

BEFORE THE HOUSE TRANSPORTATION AND INFRASTRUCTURE
SUBCOMMITTEE ON COAST GUARD AND MARITIME TRANSPORTATION

July 31, 2013

INTRODUCTION

Good morning Chairman Hunter, Ranking Member Garamendi and distinguished members of the Subcommittee. I'm Bill Vass, CEO of Liquid Robotics and I am honored to appear before you today.

Liquid Robotics is a venture backed, Silicon Valley and Hawai'i based company. Since 2007, we have been providing customers around the globe, a revolutionary way to observe, monitor and patrol our oceans and coastlines. We are doing this through the utilization of the Wave Glider®, an unmanned ocean vehicle, capable of precise navigation that can stay at sea for a year at a time without needing fuel, without polluting and without putting human lives at risk. By the end of my testimony, we will convey how this innovative wave and solar powered, unmanned ocean vehicle will help the Coast Guard exponentially expand patrol coverage, increase operational efficiencies and do so at a fraction of the cost and environmental impact of ships.

CRITICAL FACTORS FOR ENHANCED MARITIME DOMAIN AWARENESS:
UNMANNED. LONG DURATION. ALL WEATHER. PRECISION NAVIGATION.

In his 2009 testimony before this Subcommittee, Coast Guard Admiral Brian Salerno testified,

"Awareness is essential to everything the Coast Guard does. We cannot hold polluters accountable unless we can match them to their spills; we cannot keep vessels from colliding if we don't know where they are; we can't rescue survivors unless we find them; and we cannot intercept those who would do us harm if they are able to blend in with the millions of recreational boaters who lawfully enjoy our ports and coastal waters."

It is extremely difficult to achieve this level of maritime domain awareness unless you are out on the seas 24x7x365 through the harshest of weather (i.e. hurricanes, cyclones) gathering and processing data, monitoring maritime conditions and traffic and communicating this information to the key stakeholders (ex: DHS, Navy, State and Local governments).

Historically, maintaining a long duration presence at sea has been cost prohibitive. Sending ships for long duration (6-12+ months) missions can cost millions, puts human lives at risk and pollutes the environment. Aerial assets have the same time, weather and cost limitations. With the advent of the Wave Glider, the world's first unmanned ocean vehicle powered solely by the earth's natural resources, wave and solar energy, we have broken through this barrier by solving the energy problem of long term operations at sea. The Wave Glider can and has stayed at sea for years. Collectively they have traveled over 350,000 nautical miles navigating the world's oceans on missions for commercial and government customers. We've collected scientific data from the Gulf of Mexico to the Arctic, to Australia and in all the world's oceans. We've navigated across the Pacific Ocean from the California to Australia earning the Guinness World Record for the longest journey by an autonomous surface vehicle. Through this Pacific Crossing we've collected over 5.5M discrete data points, an unprecedented amount of high-resolution ocean surface data. To inspire worldwide interest in marine science, we have made this data set free to anyone who registers on our website. With this long duration, all weather technology we can help the Coast Guard greatly enhance its' maritime domain awareness and information sharing network and increase the efficiencies of high value assets for Coast Guard missions, such as search and rescue; port, waterways, and coastal security; drug interdiction; migrant interdiction and EEZ enforcement.

CAPTURING AND COMMUNICATING DATA NOT PREVIOUSLY POSSIBLE

As noted, the beauty of the Wave Glider is it can safely and economically travel to high-risk locations through all weather conditions to capture data previously not feasible. Allow me to share an example. We are working with NOAA's Atlantic Oceanographic & Meteorological Laboratory (AOML) to measure ocean surface temperatures during active hurricanes for better hurricane intensity prediction (measuring the strength of a hurricane as it makes landfall). As we have seen preparedness for a Tropical Storm vs. a Category 4 hurricane is dramatically different. Many of you on the Subcommittee are from coastal towns as am I (raised in Louisiana) and you know the tangible and intangible costs of hurricane preparedness and evacuations. Until the innovation of the Wave Glider, there has not been a viable, safe way to send a surface vehicle into a hurricane to collect and transmit real time data. Hurricane Trackers cannot measure surface and subsurface temperatures. Aerial drones get blown off target in severe winds. Stationary, moored sensors are by definition not

mobile and frequently break. Satellites are 250 miles above the surface and can not accurately collect surface data. Imagine implementing Coast Guard assets that can survive a Category 4 hurricane; one that can navigate to new locations to investigate and patrol all while continuously communicating critical, life saving information? We can and have. To date, we've navigated and communicated through 5 hurricanes and 3 cyclones including Hurricanes Sandy and Isaac. Imagine the impact on the Coast Guards' preparedness and response if we could predict hurricane strength as well as meteorologists currently forecast projected landfalls. Think about the savings of lives, property and evacuation planning.

DATA COLLECTION FROM PROTECTING THE SOUTHWEST BORDER TO TRACKING GREAT WHITE SHARKS

Our customers are anyone who operates in the ocean or moves across it. They vary from governments and large oil companies to scientific organizations and communications companies.

You may be wondering what kind of data can they collect? The answer is almost limitless. Think of the Wave Glider as a floating utility truck that you can load up a variety of sensors, communications and computing and send off on missions for 6 months to year+, covering 10s of thousands of miles at a time. You can place sensors on it, in it or under it to monitor everything from water quality to physical characteristics of the oceans to the health of fisheries or to support search and rescue missions. You can place sensors on the Wave Glider to measure climate change in the Arctic as NOAA's Pacific Marine Environmental Laboratory (PMEL) has done. Or place acoustic, radar and video sensors on fleets of Wave Gliders to provide continuous monitoring of your ports, borders or high seas assets or even great white sharks as Dr. Barbara Block of Stanford's Hopkins Marine Center has done and was highlighted on Discovery Channel's Shark Week. Since the Wave Gliders are long endurance, unmanned ocean vehicles, that do not require fuel or people to operate they can navigate to pre-determined locations for long periods of time during all weather conditions to monitor, detect and provide alerts of illicit activities against critical infrastructures. Whether they are patrolling oilrigs, coastal airports, power grids, coastlines for illegal human trafficking or drug smuggling, the Wave Gliders can quietly stay offshore (or in the high seas) gathering and processing the data then securely relaying this information to your command center, smartphone or tablet. By using the Wave Gliders for these boring yet, risky missions, they augment and increase the efficiency of your higher value assets (ships, aerial vessels) and especially people.

Wave Gliders offer a new alternative that has never existed before in support of marine domain awareness. The Wave Glider combines the accurate navigation and unpredictable scheduling of a patrol vessel with the long duration of satellites or stationary moored sensors.

They are ideal for patrol missions where someone like a smuggler may try to avoid detection by knowing the daily satellite cycles and exact locations of moorings.

CONCLUSION

Around the globe, defense departments, coastal defense forces, and oil & gas companies are faced with the daunting challenge to continuously protect and secure vast coverage areas with limited resources and shrinking budgets. The ability to have real time maritime information can be the difference between life and death, the difference between apprehending smugglers and the difference between avoiding an environmental catastrophe. The overwhelming barrier has been providing affordable, persistent or long duration, multi-sensor data for the monitoring, detection and tracking of maritime targets and conditions. As Admiral Brian Salermo stated so eloquently, "Awareness is essential to everything the Coast Guard does." To have this level of maritime awareness requires mobile, unmanned resources at the surface of the ocean collecting data from subsea sensors, collecting surface data and sharing this information amongst trusted organizations - in real time. Liquid Robotics is in a unique position to provide increased maritime domain awareness today, at a fraction of the cost of alternatives. We would be honored to help the Coast Guard gain this increased maritime advantage.

I want to thank Chairman Hunter, Ranking Member Garamendi and distinguished members of the Subcommittee for your time and the opportunity to testify before you today. I look forward to answering your questions.



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**Testimony of
Steve Morrow
President and CEO
Insitu**

On Behalf of

The Association for Unmanned Vehicle Systems International

Before the

**House Transportation and Infrastructure Subcommittee on Coast Guard and Maritime Transportation
Hearing entitled**

**"How to Improve the Efficiency, Safety and Security of Maritime Transportation: Better Use and
Integration of Maritime Domain Awareness Data"**

31 July 2013

Thank you, Chairman Hunter, Ranking Member Garamendi, and Members of the Subcommittee for inviting me to testify. My name is Steve Morrow, and I am the President and Chief Executive Officer of Insitu, a subsidiary of Boeing. Our company designs, develops and manufactures high-performance, low-cost unmanned aircraft systems, or UAS. I am speaking to you today on behalf of the Association for Unmanned Vehicle Systems International (AUVSI), the world's largest and oldest nonprofit trade association representing the unmanned systems industry.

The use of unmanned aircraft systems has grown substantially in recent history due largely to advances in computing technology, but experts all say the industry is still in its infancy. UAS hold enormous potential to increase the reach and efficiency of current systems while reducing the risk of the operations. I am here primarily to address the benefits of UAS in the maritime domain. UAS have the ability to access and survey vast expanses of our oceans and rivers to supplement the capabilities of manned vehicles and other platforms. The critical situation awareness that UAS provide could support search and rescue operations, anti-drug or anti-smuggling operations, environmental protection, anti-piracy operations and many other missions. In these missions, UAS are capable of saving time, saving money and most importantly, saving lives.

One example was described by Vice Admiral Currier in a hearing before this subcommittee on June 26 in which he described an evaluation of a small UAS aboard the National Security Cutter Bertholf. The UAS, which was launched and recovered on the cutter, flew more than 90 hours at sea and provided situational awareness beyond the reach of the existing systems available to the cutter. In one mission, the UAS provided real-time monitoring and location information of a suspicious vessel, targeting and monitoring the vessel until other Coast Guard assets arrived to interdict and apprehend the vessel's crew. The seamless transfer between UAS and manned aircraft and vessels – through regular communication – resulted in the successful interdiction of over 1200 pounds of cocaine, the first such UAS-aided effort by the Coast Guard. In an even more high profile example several years prior, the same UAS provided persistent observation for military units during the rescue operation of Richard Phillips, captain of the Maersk Alabama, from Somali pirates in 2009.

While the Coast Guard is at the early stages of utilizing UAS, other agencies have initiated UAS programs more extensively. The National Oceanographic and Atmospheric Administration (NOAA) has implemented an ongoing UAS program that has performed ten test projects to date. NOAA has acknowledged that optimizing this technology could provide improved and cost-effective understanding of oceanic and atmospheric exchanges, hurricanes, wildfires, marine ecosystems, and other environmental and ecological processes. This would ultimately lead to improved climate and weather predictions, and management of marine resources.

In addition to U.S. government application, commercial application of UAS can benefit environmental monitoring and scientific analysis in regions not accessible by manned aircraft, or information gathering for commercial enterprise along coastal regions. As the Federal Aviation Administration finalizes its regulations of UAS in the national airspace, we believe that there will be further opportunities for government agencies – in particular the Coast Guard – to work with commercial UAS in furtherance of its missions.

The information gathered by a UAS can be both cost effective and timely, allowing all maritime operators the ability to do their jobs more economically, effectively and efficiently. There should be no doubt that the future of maritime domain awareness should and will include unmanned aircraft.

Mr. Chairman, the UAS industry also holds the potential to be an engine of economic growth for our nation. A study by AUVSI finds that the unmanned aircraft industry is poised to create more than 70,000 jobs in the first three years following the integration of UAS into the national airspace. By 2025, that number is estimated to rise to 103,776 new jobs – with an economic impact of more than \$82.1 billion over that period.¹

I thank you again for the opportunity to testify today, and I look forward to answering any questions you might have.

¹ Economic impact includes the monies that flow to manufacturers and suppliers from the sale of new products as well as the taxes and monies that flow into communities and support the local businesses. For more information, please visit <http://www.auvsi.org/econreport>.

WRITTEN TESTIMONY OF

Lisa Hazard
 Operations Manager, Coastal Observing Research and Development Center
 Scripps Institution of Oceanography
 University of California, San Diego

**BEFORE THE UNITED STATES HOUSE COMMITTEE ON TRANSPORTATION AND
 INFRASTRUCTURE
 SUBCOMMITTEE ON COAST GUARD AND MARITIME TRANSPORTATION**

**HOW TO IMPROVE THE EFFICIENCY, SAFETY, AND SECURITY OF MARITIME
 TRANSPORTATION: BETTER USE AND INTEGRATION OF MARITIME DOMAIN
 AWARENESS DATA**

July 31, 2013
 Washington, D.C.

Chairman Hunter, Ranking Member Garamendi, and members of the Subcommittee, thank you for the opportunity to appear before you today. My name is Lisa Hazard, and I am the Operations Manager for the Coastal Observing Research and Development Center at UC San Diego's Scripps Institution of Oceanography (Scripps). At Scripps, I manage and supervise a team of technical staff in the operations and maintenance of distributed environmental sensor networks developed, deployed, and maintained by the Center. As a graduate of the U.S. Naval Academy, I had the opportunity to study at the U.S. Coast Guard (USCG) Academy as an exchange student. This experience gave me a better sense of USCG missions and the need for accurate and timely observations for mission critical applications.

My experience with near real-time observations includes managing data from the nation's network of high frequency (HF) radar designed to map coastal ocean surface currents, meteorological stations deployed in theater in support of U.S. Navy and Marine Corps operations and drifting oceanographic sensors designed to improve global ocean wave models. I have served as the Southern California Coastal Observing System (SCCOOS) Data Management and Communications (DMAC) representative to the U.S. Integrated Ocean Observing System (IOOS). I presently serve as the IOOS HF radar data management lead for IOOS and am a U.S. representative to the Global Group on Earth Observations (GEO) for topics pertaining HF radar. I will talk more about our emerging technologies and use of data management and visualization to provide pertinent information management to operational applications.

Because many Scripps scientists and students are involved in ocean observations for maritime domain awareness, I sought input for my testimony from USCG representatives and experts at Scripps. Aspects of my testimony on the specifics of technologies and data management are drawn from these sources and corroborated by my 14 years of experience working with ocean observations. I also had the opportunity to review the Government Accountability Office report on the Coast Guard implementation of the Common Operational Picture (COP) and will base the majority of my testimony addressing recommendations to concerns raised in the report.

**Long-term Earth and Ocean Observation Programs at Scripps Provide a Foundation for
 Environmental Knowledge of Maritime Domain Awareness**

Founded in 1903, Scripps Institution of Oceanography became a part of the University of California in 1912. Scripps has a long history of supporting national defense objectives and has provided

recommendations and technologies to “improve the efficiency, safety and security of maritime transportation” with a focus on the “better use and integration of maritime domain awareness data.”

During World War II, Scripps oceanographers worked closely with the Navy to create surf and swell forecasts for successful Allied landings in North Africa, the Pacific, and the beaches of Normandy. Scripps researchers also developed high frequency underwater sound systems to track submarines and detect mines, enabling secure Naval operations and improving maritime domain awareness. Research at Scripps currently encompasses physical, chemical, biological, geological, and geophysical studies of the oceans and Earth, with annual expenditures approaching \$200 million and a fleet of four research vessels and Floating Instrument Platform (FLIP). Scripps has a long history of initiating and maintaining environmental observing programs in the oceans, atmosphere and on land at regional to global scales. These observations are core to scientific discovery across numerous disciplines, and inform our understanding of society’s most pressing issues.

In 1975, Scripps researchers launched the Coastal Data Information Program (CDIP), a program that measures, models, forecasts and publicly disseminates real-time coastal wave information, and that now includes a network of over 50 wave buoys in 13 states and island territories. CDIP provides these updated and accurate wave data to the US Army Corps of Engineers (USACE), the National Oceanic and Atmospheric Administration (NOAA), and other federal agencies. The data are also critical for the operational maritime community to ensure safe and efficient navigation for military, commercial, and recreational maritime traffic, and are relied upon by dredging project managers for safe operations. CDIP buoys provide highly accurate wave height, period, and direction information, which are used as input to marine forecasts and incorporated into coastal inundation models. During Hurricane Sandy, the CDIP wave buoy network on the East Coast provided continuous, near real-time wave observations (reported every 30 minutes) without failure or interruption. In fact, over 99% of all data produced by CDIP buoys during the storm were successfully transmitted.

In 1998, Scripps led the development of the revolutionary array of ocean monitoring sensors known as the Argo network. Launched in 2000, the Argo program now deploys a global array of more than 3,600 free drifting profiling floats to gather subsurface ocean data. Combined with satellite observations, these data make it possible to operate global and regional ocean analysis models similar to those for weather forecasting in the atmosphere. They provide enormous amounts of new information on the ocean’s changing state at weekly to seasonal to year-to-year timescales. These observations and model analyses provide the data on open ocean conditions needed for weather forecasting, safe shipping and effective fisheries management, as well as offshore data needed for coastal ocean analyses.

Improving the Use and Integration of Maritime Awareness Data: the Need for Technology Demonstrations and Modular, Problem Driven Applications

Need for demonstrations:

A significant investment of time, funds, and process documentation is required for a full scale analysis of developing technologies for USCG applications and implementation. Although costly, process studies are required to determine applicability and feasibility of new technologies. Scripps recommends developing partnerships with agencies such as the Office of Naval Research (ONR) for conducting small scale demonstrations to test concept of operations of new technologies and applications. These demonstrations have the ability to provide a low cost, flexible, and timely analysis of science and technology programs that are applicable to operational needs. Depending on the success of the demonstration, results can be scaled to larger processes and provide required analysis of risk, operational costs, manning requirements, and costs. Successful demonstrations can be scaled to support operations, while unsuccessful demonstrations provide valuable lessons learned and save significantly on a USCG wide full scale information technology guidance procedure.

An example of such a demonstration is the Persistent Littoral Surveillance (PLUS) Program for Naval Special Warfare (NSW) applications. NSW operations can be aided by accurate and timely meteorological and oceanographic (METOC) data and forecasts. Similar METOC environmental sensing requirements are shared by U.S. Marine Corps (USMC) marine expeditionary groups who have pressing technology gaps for sensing and predicting changing weather conditions in mountainous and desert terrains. Unfortunately, regions of interest can be data poor, introducing gaps of knowledge which can only be met through placement of environmental sensors and dependence on environmental models that have unknown accuracies when used in new coastal regions. In addition, environmental sensor data and environmental model outputs are perishable when used for operational decision making as the data is needed in near real-time. This places requirements on the need for tools to conduct timely synthesis of METOC information. The Marine Physical Laboratory at Scripps developed, tested, and evaluated new instrumentation and sensor operation procedures for improving tactical ocean and atmospheric environmental information collection. Efforts focused on developing techniques and procedures for best operational usage of powered unmanned underwater vehicles and optimal methods for exploiting and fusing underwater imagery, sidescan sonar, and oceanographic data collected by the platforms.

There is value in establishing and carrying out these demonstrations with the participation of other agencies. For example, there are USCG and Office of Naval Research partnerships that exist for research programs in the Arctic; and operational partnerships exist in the Joint-Interagency Task Forces (e.g. JIATF-S, JIATF-W) for combatting illegal drug trade on the high seas. In May 2013, the U.S. Coast Guard R&D Center requested assistance from the Office of Naval Research to host a classified workshop to bring USCG personnel up to speed on emerging naval systems that might be relevant to addressing the challenges of maritime domain awareness. An outcome of the workshop was the identification of various concepts of operation for different MDA challenges facing the U.S. Defining demonstration efforts as follow-on to the workshop might be a logical next step.

Need for problem driven, modular interfaces:

The use of mapping overlays for data visualization can be extremely useful for displaying observations that assist in USCG missions such as search and rescue operations, marine safety and security, marine environmental protections, and ice operations. There is a wealth of direct observations and derived products that can be integrated into these systems including, but not limited to:

- 1.) Automatic Identification System (AIS)
- 2.) Bathymetry
- 3.) Navigational Charts
- 4.) Waves
- 5.) Surface and subsurface currents
- 6.) Meteorological Observations
- 7.) Satellite imagery
- 8.) Ice distribution

Many of these observations are available in a common data format that can be self-describing, machine-independent and delivered through a web service. Examples of these observations are found within the Integration Ocean Observing System (IOOS) which, for many gridded products, utilize a Network Common Data Format (NetCDF) for file structure and are distributed via a Thematic Real-time Environmental Distributed Data Service (THREDDS). The Open Geospatial Consortium (OGC) provides recommendations and examples of data formats and services for data sharing and delivery. These technologies are developed and have proven examples for in-situ time series data (e.g. AIS, temperature, wind speed, salinity); gridded data and model output (e.g. HF radar derived surface currents, waves, ice coverage); and imagery feeds (e.g. remotely sensed ocean color, pictures, charts). The data can also be displayed via open source – online platforms such as OpenLayers and Google Earth for unclassified

interfaces or closed source, desktop applications for classified interfaces such as the Topside application from Naval Undersea Warfare Center (NUWC).

A USCG example is the Search and Rescue Optimal Planning System (SAROPS). This is an ArcGIS 9.3 (soon to migrate to 10.1) application designed specifically for search and rescue. SAROPS is directly supported by the Environmental Data Server (EDS), which accesses environmental data and models, archives that data, and upon request from SAROPS, returns data cubes for the SAROPS trajectory predictions. The EDS gathers data from the HF Radar National Network (HFRNet) and short term prediction based upon HFR data. I will expand upon this system and its history in the section addressing HF radar. A separate, but compatible tool, could be designed for tracking submerged oil spills, monitoring fishing areas or maintaining vessel awareness. Throughout my experience in data management, I have found that "system of systems" or "one-stop shops" inevitably fail due to volume or complexity. Lightweight, problem/user driven applications are much more effective, easy to use, flexible, and can be rapidly developed if the user needs are well understood. Underlying data feeds, such as the EDS, that are common to all applications are easily reused and custom products for the specific problem can be developed and added. Modular, problem driven applications will be more cost effective, straight forward to use, and flexible.

Scripps recommends designing modular, problem driven applications that can be built upon the same technology, but are tailored to a specific application or problem area. This approach was taken when developing an online visualization for the pilots in Los Angeles/Long Beach harbor. They were primarily interested in overlays of charts, waves, surface currents, and wind predictions. An online, interactive application was built to match their needs.

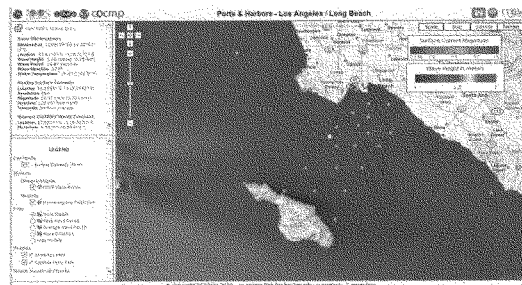


Figure 1. SCCOOS online ports/harbors custom interactive application

Improving the Use and Integration of Maritime Domain Awareness Data: the Use of Emerging Technologies

High Frequency Radar (HFR):

High-frequency radar (HF radar) systems measure reflecting radio waves off the surface of the ocean. Each HF radar land-based installation is sited near the coastline and includes two antennas: the first transmits a radio signal out across the ocean's surface, and the second listens for the reflected radio signal after it has bounced off the ocean's waves. By measuring and processing the change in frequency of the radio signal that returns, known as the Doppler shift, the system determines how fast the water is moving toward or away from the antenna. Data from neighboring antennas are processed and displayed to the user as surface currents maps in near real-time.

A national HF radar network (HFRNet) has been established to measure surface currents throughout the U.S., and is currently used in operational applications. Scripps developed and has operated data management for integration, distribution, and visualization of HFR surface currents for close to 10 years. The network includes approximately 31 participating organizations, 130 radars, and over 7 million files.

Beginning in 2000, the USCG Research and Development Center began a multi-year investigation into the utility of near real-time HF radar derived surface current measurements for search and rescue (SAR). This assessment showed a better comparison of radar-derived currents when compared against available NOAA tidal current predictions. Additionally a key element using the HF radar currents was the development of the Short Term Predictive System (STPS), a forecasting model that uses statistical information for surface current prediction. Following these evaluation studies, available in situ data were used to evaluate and define appropriate parameters for inclusions in the USCG search and planning tool as the inclusion of HF radar currents reduced the search area for USCG operators by two-thirds. Current velocities from HFRNet and the STPS forecasts are included in the USCG SAR Optimal Planning System. Data is made available in an easily digestible format through web services that were previously mentioned. This allows for integration in multiple applications and the data are used across an array of varying operational GIS based displays.

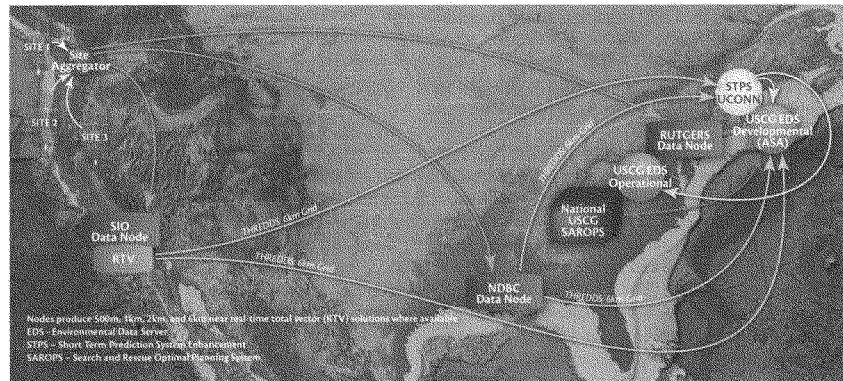


Figure 2. HFRNet data distribution for the SAROPS tool

Additional integrated operations applications include:

1. Oil Spill: Office of Response and Restoration (OR&R) Emergency Response Division (ERD) - Official NOAA forecasts for oil spill trajectories General NOAA Operational Modeling Environment (GNOME); National Preparedness Response Exercise Program (NPREP); CA Office of Spill Prevention and Response (OSPR)
2. Environmental Assessment: Office of Response and Restoration (OR&R) Assessment and Restoration Division (ARD) - Environmental Response Management Application (ERMA)

HF radar technology is being developed for over-the-horizon ship tracking applications and is an emerging technology for maritime domain awareness. In 2008 the Department of Homeland Security established the National Center for Secure and Resilient Maritime Commerce (CSR) and the Center for Island, Maritime, and Extreme Environmental Security (CIMES) – DHS Science & Technology (S&T) sister Centers of Excellence (CoE). Their mission includes basic research and education that develops and

transitions new technologies supporting Maritime Domain Awareness (MDA) at three scales – the global scale observed via satellite, the approach scale observed by beyond-the-horizon HF radar, and the local scale observed via line-of-site microwave radars, cameras and underwater acoustics. The HF radar research focused on development of a dual-use surface current mapping and vessel-tracking capability. This capability is designed to bridge a surveillance gap between the low update rates provided by global satellite coverage and the high update rates of local line-of-sight microwave radars and underwater acoustic sensors in ports and harbors. CSR established the first two multi-static dual-use HF radar sites that began reporting real-time surface-current mapping and vessel-detection results to an aggregation center in 2011. Two independent DHS studies indicate that: (a) a network of inexpensive compact HF radars is more effective and robust to countermeasures than large single radars; and (b) the demonstrated dual-use vessel-tracking capability indicates that a multi-static HF Radar network is a viable approach for establishing a national MDA capability. This technology will enable a long range (~200km) view of vessels and can provide valuable information for situational awareness.

Unmanned Vehicles:

Unmanned Underwater Vehicles (UUVs) or Autonomous Underwater Vehicles (AUVs) continue to develop as the frontier technology for subsurface exploration and sensing advances. Examples include buoyancy driven gliders, such as the SPRAY system developed by Scripps for wide area environmental surveillance and propeller powered vehicles such as the REMUS (Remote Environmental Monitoring Units), originally designed by Woods Hole Oceanographic Institution (WHOI) and now available commercially from Hydroid Inc., for higher resolution applications. Both vehicles can employ acoustic, optical, and physical sensors to analyze open ocean, littoral and benthic environments and can assist the USCG in detecting and tracking oil spills of unknown origin. Gliders were used extensively during the DeepWater Horizon incident to support oceanographic circulation models of the Gulf of Mexico. Through IOOS, the glider community is working to develop a common data format for distribution and visualization of glider sensor output.

Unlike ship mounted sensors, the REMUS UUV has a distinct advantage to navigate a grid or terrains with consistent and thorough geo-positioned tracks. Scripps currently has been operating REMUS UUVs for over 6 years and performs a variety of experiments from outfall plume tracking outside San Diego Bay to discovering ship and plane wrecks in Palau. Most recently, in March of 2013, a team of Scripps researchers dedicated three weeks to mapping habitats, measuring unique hydrodynamic environments, and locating lost planes and ships in the Republic of Palau. Using a built-in side-scan sonar, two vehicles were able to survey and map 7.3 square miles with 10 centimeter resolution in 21 days. From the surveys, the team discovered one WWII plane and 3 new WWII Daihatsu landing craft wrecks. Despite 70 years of decay, underwater video and dive sonars allowed experts to identify the plane as an E15K Shiun (Violet Cloud) that the allies historically reported as “Norm.” Mosaics of the entire seafloor have the capability to show large overarching coral patterns to details as fine as sunken buoys and anchor scours. Onboard sensors such as fluorometers can measure the presence of oil. Aggregation of imagery and sensor information can assist the USCG mission in determining oil leaks from submerged wrecks.

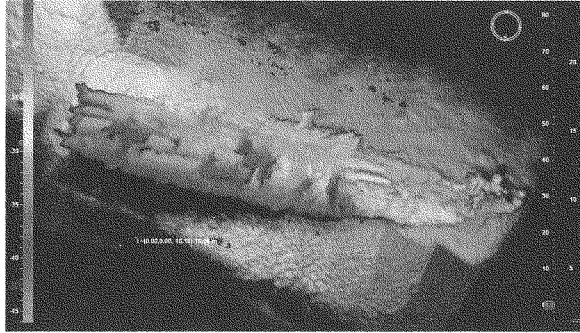


Figure 3. Mosaic image of submerged wreck from REMUS sonar

Additionally, gliders were used in the 2010 Deepwater Horizon explosion for analyzing water column properties and detecting the presence of oil. Gliders narrowed the search zone for subsurface oil and provided valuable information to help answer key questions about potential movement of oil. Through IOOS, the glider community is establishing a common data format for glider near real-time data feeds. This will significantly improve the ease of ingestion and display of glider data retrieved from varying platform vendors.

Scripps is also developing expertise in the use of Unmanned Aerial Vehicles (UAVs) or Autonomous Aerial Vehicles (AAVs). Systems of various sizes have been flown in support of atmospheric and oceanographic data collection. Example applications include the mapping of aerosols and airborne pollution, measurement of waves and sea state, measurement of atmospheric wind fields and the exchange of heat and energy with the ocean, and the surveying of riverine and coastlines. Scan Eagle UAVs and smaller, multi-rotor vehicles have been launched and recovered from our research vessels by Scripps scientists.

Research Vessels and Education/Training:

Scripps can provide an educational role to USCG through MS and PhD programs, especially through the Applied Ocean Sciences (AOS) program. A recent USCG masters graduate of the program went on to teach at the USCG Academy and is now at Office of Science and Technology Policy, Executive Office of the President. Additionally, grants provide partnerships for education and training. Through the National Science Foundation's (NSF) program Ship-based Science Technical Support in the Arctic (STARCS), Scripps provides marine science and technical services to NSF-supported research cruises aboard the U.S. Coast Guard cutters HEALY and POLAR SEA. This program is a collaborative between the Shipboard Technical Support (STS) department at Scripps and the Marine Technician Group (MTG) at Oregon State University (OSU) that provides the highest level of shipboard technical support possible. The program uses a model for arctic shipboard technical support that follows best practices of the University-National Oceanographic Laboratory System (UNOLS) fleet.

An Arctic Mission Coordinator at Scripps is responsible for creating and overseeing the scientific planning process, using existing methods, modified to suit the needs of scientists sailing on the USCG cutters in the Arctic.

Education and training of students, new technicians and USCG personnel in use of technology and techniques at sea are among the broader impacts of this proposal, thus growing the technical knowledge base that supports U.S. oceanographic research. Scripps supports the acquisition and appropriate handling of underway shipboard data in concert with national data centers such as the NSF-supported Rolling Deck to Repository (R2R) program, making data available to the academic community and the public at large. Scripps and OSU will coordinate with NSF, USCG and the Arctic Icebreaker Coordinating Committee to define priorities for maintenance and upgrades to science equipment onboard.

Thank you again for the opportunity to testify on improving efficiency, safety and security of maritime transportation and maritime domain awareness. Scripps' scientists are leaders in research and operational use of maritime technologies and have a long history with national defense. Scripps recommends developing partnerships with other agencies (e.g. ONR) to provide low cost demonstrations of emerging technologies that can then be applied to full-scale operations, providing valuable feedback and business case requirements such as risk, cost, and manning requirements. Designing problem driven, modular applications for USCG missions will improve data reliability and performance as well as reduce complexity for watch standers. The use of data products from high frequency radar (e.g. surface currents and vessel tracking), unmanned underwater vehicles, and research vessels will significantly improve all aspects of USCG missions.

WRITTEN TESTIMONY OF

Newell Garfield, III, Ph.D.
 Director, Romberg Tiburon Center for Environmental Studies
 Professor of Oceanography
 San Francisco State University

HEARING ON:

**HOW TO IMPROVE THE EFFICIENCY, SAFETY, AND SECURITY OF
 MARITIME TRANSPORTATION: BETTER USE AND INTEGRATION OF
 MARITIME DOMAIN AWARENESS DATA**

**BEFORE THE SUBCOMMITTEE ON COAST GUARD AND MARITIME
 TRANSPORTATION**

Good Morning Chairman Hunter, Ranking Member Garamendi and Members of the subcommittee. Thank you for the opportunity to testify on the "Use and Integration of Maritime Awareness Data."

I am an observational physical oceanographer and have spent over thirty years collecting and analyzing oceanographic data on waves, currents and tides. I am a professor of oceanography at San Francisco State University and the Director of the University's environmental studies facility. The Romberg Tiburon Center is the only educational and research laboratory located directly on San Francisco Bay. I am a fellow of the California Academy of Sciences and hold long-term memberships in the American Geophysical Union and the Oceanography Society. I am a founding member of the Central and Northern California Ocean Observing System or CeNCOOS, one of the 11 regional observing systems within the U.S. Integrated Ocean Observing System (IOOS) that build on local expertise and knowledge to meet national ocean observing needs including safe marine operations.

My expertise is on how and why ocean water moves. I have done many experiments investigating specific phenomena like upwelling dynamics and coastal boundary currents. For the last 15 years I have put increased emphasis on collecting the environmental data critical to any activity on the water—in particular, coastal ocean currents and the water masses in coastal and estuarine environments. This has provided me opportunity to interact with both the Coast Guard Search and Rescue Operations (SAROPS) personnel and the National Oceanic and Atmospheric Administration (NOAA) Office of Response and Restoration (OR&R).

I start with the premise that since this is a Subcommittee on the Coast Guard and Maritime Transportation, it is given that the ocean is critical for both the prosperity and safety of our citizens. Knowledge of the ocean is essential for this country.

Maritime Domain Awareness is broad, encompassing the critical issues of safety, security and stewardship. My testimony today is that thanks to the innovative approach that IOOS is taking and the infrastructure it is building, real-time environmental data are now

readily accessible to the Coast Guard to support Maritime Domain Awareness - and the Coast Guard is utilizing these data.

Overview of U.S. IOOS Program

The inclusion of real-time environmental data is possible because in 2009 the U.S. IOOS was created by Congress as a Federal – regional partnership charged with providing real-time and sustained observations on our coasts, oceans and Great Lakes. NOAA is the IOOS lead of 17 Federal agencies, including the U.S. Coast Guard, that are working together to provide seamless access to coastal ocean data. All 11 regional ocean observing associations collect environmental data and disseminate the data in open formats. Today, over 50 percent of the data provide to the Global Telecommunication System by NOAA's National Data Buoy Center (NDBC) comes from non-federal sources, most of which is directly attributable to the IOOS data management system and the work being done and supported by the Regional Associations. No proprietary data formats are used; this allows anyone to access the data.

In a maritime event, whether search and rescue or a pollution spill, two sets of data are critical to a successful initial response. The first is knowing when and where an event is initiated. The second is knowing how the currents will transport the objects or substance of interest. In the past, numerical models were the primary tool available for predicting ocean currents. The accuracy of such models depends on three factors: the physics that are used to drive the currents and the initial environmental conditions used to start any model run, and the environmental data used for forcing and assimilation during the model run. Over time, models have improved as computer capacity has increased, allowing finer resolution and enhanced "physics." Still, for any model to be effective in a real time response, knowledge of the initial, and ongoing, environmental conditions are critical and must be obtained from observational data.

Use of U.S. IOOS Data by the Coast Guard

Three examples illustrate how access to IOOS real time observational data has greatly improved the Coast Guard's Maritime Domain Environmental Awareness.

The first example starts in California, but involves much of the United States. In 2002, California voters approved two propositions that provided \$21 million in funding to monitor ocean surface currents along the whole California coast. A collaboration of 10 public and private universities were awarded the contract to create an array of shore-based radio instruments that can measure the ocean surface currents in real time from the shore out to a distance of 130 km with a spatial resolution of 6 km on an hourly basis. These instruments, called high frequency radar (HF radar), are robust, accurate and economical to maintain. Between 2004 and 2006, an array of 43 instruments was deployed covering the entire California coast. The data are accessible through the two IOOS regional observing associations located in California CeNCOOS and the Southern California Coastal Ocean Observing System (SCCOOS) and the NOAA NDBC site. A common format was agreed upon and tailored products for both NOAA and the California Office of Spill Prevention and Response were produced. California Lieutenant Governor John Garamendi supported this State effort.

The 2005 interagency “Safe Seas” spill response training exercise off San Francisco included actual observed surface currents, measured by the HF radar array. The utility of having access to real time surface currents caused one Coast Guard officer to exclaim “I love HF radar.” During the subsequent 2007 Cosco Busan fuel spill incident both NOAA and the Coast Guard accessed the same real time HF radar data during response operations in San Francisco Bay and the Gulf of the Farallones. This led to NOAA adopting protocols to include HF radar data in the NOAA model used to provide environmental conditions to the Coast Guard.

Other HF radar arrays have been established by different IOOS Regional Associations (Figure 1.). In each case, funding to implement the arrays came from non-traditional sources and now the system operations are primarily supported by IOOS. In 2005 IOOS developed a plan for making this technology into a national system. The National Surface Current Mapping Plan is now being implemented within all 11 IOOS regions. Data from these regions are processed and made publically available through NOAA’s NDBC and feeds directly into the Coast Guard’s operational models for use in search and rescue activities (second example below).

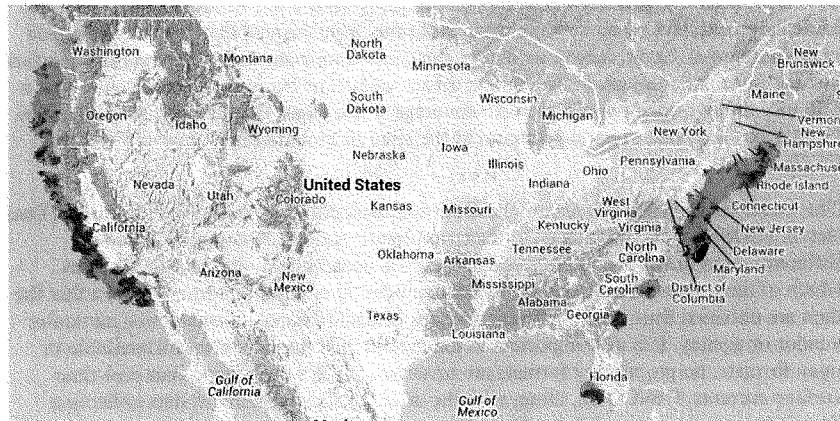


Figure 1. The distribution of HF radar determined surface currents along the coast of the continental United States. Image is for July 26, 2013 and warm colors represent higher speeds of the surface currents. Four IOOS regional observing associations—CeNCOOS, MARACOOS, NANOOS and SCCOOS—maintain the country’s largest HF radar arrays.

During the response effort to the 2010 Deepwater Horizon oil spill the Unified Area Command was able to access data and model output from local universities, state agencies and private companies, increasing their understanding of the ocean conditions affecting the path of the oil. The IOOS network also deployed a fleet of underwater gliders, borrowed from regions across the country, to the Gulf area to assist with monitoring the subsurface flow of oil. Deepwater Horizon was the first time that Federal

responders had routine access to non-federal information, which was enabled by the protocols developed by the IOOS data management system.

An IOOS goal is to create a single ocean data system that can serve multiple national and regional missions. Instead of each mission agency or regional program creating its own issue-specific ocean and coastal observing system, IOOS strives for one system that can be used by many agencies, programs and individuals. For example, real-time information on the speed and direction of surface currents is used by the U.S. Coast Guard in search and rescue operations, by fisheries managers to model the transport of fish larvae, by regional scientists to forecast harmful algal blooms, by commercial shippers to pick coastal routes, by aquaculture enterprises for water quality, by recreational boaters for safe outings and by public health officials to understand beach water quality. "Measure once, use multiple times" is the IOOS mantra.

A second example of the Coast Guard's use of IOOS data is using HF radar data to dramatically improve the ocean surface current estimates used in search and rescue. The traditional model used to direct searches was based on historical estimates of the tidally driven currents and the strength of the wind to estimate where a person in the water would drift. Using real time currents obtained from the HF radar instruments, it was determined that the search time could be reduced by two-thirds because of the improved knowledge of the currents through using real time observational data instead of the tide and wind model. Again, where available, the Coast Guard routinely uses real time surface current information to aid in the conduct of searches. The National Plan estimates that a \$20 million investment would provide coverage to the Coast Guard's high priority areas. NOAA has provided operating support at the level of \$5 million per year in FY12 and FY13.

The Coast Guard SAROPS access these environmental data from the Environmental Data Server (EDS) system maintained by their contractor ASA. EDS supports over 50 different environmental data products and each is accessible by the SAROPS teams. Much of those data are supplied by IOOS members. It is important to emphasize that the data are obtained from many different sources instead of being restricted to a particular vendor or agency. It is also important to understand that these data are all available in open formats; no proprietary formats are involved. IOOS serves more than real-time surface currents. CeNCOOS, along with the other 10 regions, support data collection from buoys, underwater gliders, pier stations and other means.

The third example is how other technology has assisted in improving maritime commerce and safety. An IOOS collaboration with the US Army Corps of Engineers' Coastal Data Information Program (CDIP) has been placing buoys that accurately measure both waves and swell at critical locations. In the San Francisco area, tugboat operators requested that one of these buoys be placed on the San Francisco entrance bar to monitor the wave conditions at this dangerous spot. With IOOS collaboration, the buoy is maintained at this location. The number of Coast Guard responses to the area dropped from nearly 80 in 2005 before the buoy was deployed to less than 20 in 2009. Clearly, there is a critical need for the type of real time data that IOOS and its partners are providing.

Recommendations and Conclusion

In conclusion, I would like to reiterate that the development of the IOOS system gives the Coast Guard unprecedented access to environmental data. IOOS is building critical infrastructure to provide real-time information about our oceans, coasts and Great Lakes. As the system expands, the Coast Guard will continue to derive benefits through access to ever more detailed environmental data. The interagency partnership and network of regional observing systems is based on sound science and is a model for building cost-effective programs to serve multiple needs. The Coast Guard, particularly the SAROPS group and the Unified Area Command group, have done a very good job ensuring that the agency has access to the environmental data essential for good Maritime Domain Awareness.

I recommend that the Coast Guard strive to utilize all non-classified environmental data available through the IOOS servers in their operational protocols and ensure that the different divisions within the Coast Guard utilize common protocols to access the data. The distributed observing infrastructure being developed by IOOS is as critical to the Coast Guard's functions as is its boats, piers and other infrastructure. Real-time observations and models directly enhance the Coast Guard's maritime domain awareness by providing rapid access to the best available science-based information. Also, I urge divisions of the Coast Guard to become members of their respective Regional Associations. Membership strengthens the collaboration between the organizations and provides a more efficient mechanism to create operational applications from IOOS data that the regional observing systems collect.

This approach of sharing the collection and dissemination of environmental data should be encouraged and supported by all 17 federal agencies who are party to the IOOS legislation. Since the Coast Guard is one of the parties and primary beneficiaries of IOOS, the Coast Guard should be commended for utilizing the available data and supporting efforts to maintain the data collection and dissemination.

INTERNATIONAL LONGSHORE AND WAREHOUSE UNION
BEFORE THE
HOUSE SUBCOMMITTEE ON COAST GUARD AND MARITIME TRANSPORTATION
July 31, 2013

Chairman Hunter and members of the Committee, thank you for holding a hearing on maritime domain awareness. Maritime domain awareness is the effective understanding of anything associated with the global maritime domain that could impact the United States' security, safety, economy, or environment. The United States Coast Guard (USCG) is the principle agency in protecting those who work in our nation's maritime domain. We are submitting a statement today because safety zones instituted by the U.S. Coast Guard around vessels servicing grain export terminals in the Pacific Northwest go beyond protecting the safe navigation of waters and we submit are intended to limit the free speech rights of union members. In the case of a strike or lockout, the USCG or any other federal agency should never interfere with the free speech rights afforded by the National Labor Relations Act of striking or locked out workers.

The International Longshore and Warehouse Union (ILWU) expresses opposition today regarding the newly proposed temporary safety zones around all inbound and outbound grain shipment and assist vessels in commerce with Columbia Grain, United Grain Corporation, Temco Kalama, Temco Irving, and Louis Dreyfus Facilities. Members of the ILWU have been locked out from two of these grain facilities for months. We are concerned that the Coast Guard's safety zones are too broad and impede the ILWU's right to picket and educate crew members of the grain companies.

Background

On June 4, 2013 the US Coast Guard (USCG) issued a modified temporary interim rule concerning the safety zones. Previously, the interim rule was published on January 30, 2013. The temporary interim rule was enacted following an ongoing labor dispute between certain employers of the Pacific Northwest Grain Handlers Association (PNGHA) Both Columbia Grain and United Grain Corporation have locked out workers represented by the ILWU. Since March members of the ILWU have been engaging in land and on-water picketing demonstrations. The primary purpose of on-water picketing is to raise awareness of ILWU worker grievances as well as allow incoming vessels the choice not to cross picket lines. Since protesting began in March the picketers have been peaceful and legal under the National Labor Relations Act (NLRA) and First Amendment.

The ILWU contends that the new rule is overly expansive, arbitrary, and intentionally places the ILWU workers at a disadvantage. The expansion of the new rule from the previous is outlined below:

First, the new rule applies to both grain shipment vessels *and* grain assist vessels, whereas the previous rule *only* applied to grain shipment vessels. Second, vessels engaged in commerce with Louis Dreyfus were not included in the previous rule. Further, the previous rule applied only to grain shipment vessels engaged in grain worker and grain vessel transfers. The new rule by contrast applies to any vessel at any time on the Columbia or Willamette Rivers. The underlying rule requires a distance of 500 yards ahead and 200 yards abeam of each grain shipment vessel. This is the equivalent of several football fields.

The rule purposefully disenfranchise ILWU members' rights

We maintain that the USCG has chosen to take the side of the Japanese grain conglomerates at the expense of U.S. workers. This isn't the first time that the Coast Guard sided with the grain conglomerates. US Coast Guard Enforcement Chief Marc Warren sent a congratulatory note to the local Sheriff for his politically motivated arrest of the ILWU President, Robert McEllrath, on a civil disobedience charge. Warren's e-mail was obtained through a Freedom of Information (FOIA) request. This e-mail was written in 2011 during a dispute between the Export Grain Terminal (EGT) and the International Longshore and Warehouse Union to win a fair contract.

The US Coast Guard's official position is that they do not take sides in labor disputes such as the one experienced with EGT or the current dispute with the Japanese grain conglomerates. How exactly are they to be believed given that the USCG Columbia River Sector Enforcement Chief is in favor of a politically motivated prosecution of a labor leader?

The biased attitude towards labor as cited above exacerbates ILWU's concern with the lack of reason for expanding the safety zones. Doubling the yardage of the safety zones around the assist vessels is drastic and only hurts ILWU picketing efforts. At such a distance incoming vessels will not be aware of picket lines and therefore not given the choice to honor them. Moreover, ILWU protesters cannot be seen nor can they be heard at all. ILWU workers believe these regulations are intentionally designed to work against ILWU protest efforts.

The rule carries national implications

Stifling the ability for the ILWU to establish picket lines puts workers at a disadvantage against their employers in the labor dispute. Adopting the new rules carries national implications by rendering what is legal under the National Labor Relations Act illegal under the Coast Guard's new rule. The Coast Guard's new rule disrupts the careful balance between management and employees and employees' rights to engage in activity like water-picketing.

The rule does nothing to increase safety

We understand the USCG rule is intended to ensure the safety of protesters and crewmembers, as well as to protect the grain vessels. However, there have been no safety incidents or otherwise that would necessitate an expansion of safety zones against picketers. The protests that have occurred on the Columbia River against these grain companies have been peaceful and safe. Additionally, USCG is already given expanded authority to regulate waterways in these circumstances. A total ban on entering the expanded safety zones is unnecessary to achieve the purpose of hazardous navigation conditions for vessels and crewmembers.

The rule is impossible to abide

Also troubling is the question, if adopted, of how to anticipate where a safety zone of such magnitude will be surrounding a moving vessel on a river. Because the expanded zones are “floating,” ILWU members are concerned that an incoming vessel could purposefully cause on-water picketers to violate the temporary safety zones by skirting the shore closest to where the picket is staged. In *Schenck v. Pro-*

Choice Network of W. New York, similar floating buffer zones were struck down as unconstitutional because of their uncertainty and unnecessary burden on free speech.

Again, the ILWU objects to the proposed safety zones. We ask that the Committee urge the USCG to allow pickets that will have an effect on incoming crewmembers – a right guaranteed by the National Labor Relations Act. Maritime domain awareness must not be used to issue rules that trample on the Constitutional rights of workers in the Pacific Northwest or any other maritime region of the country.