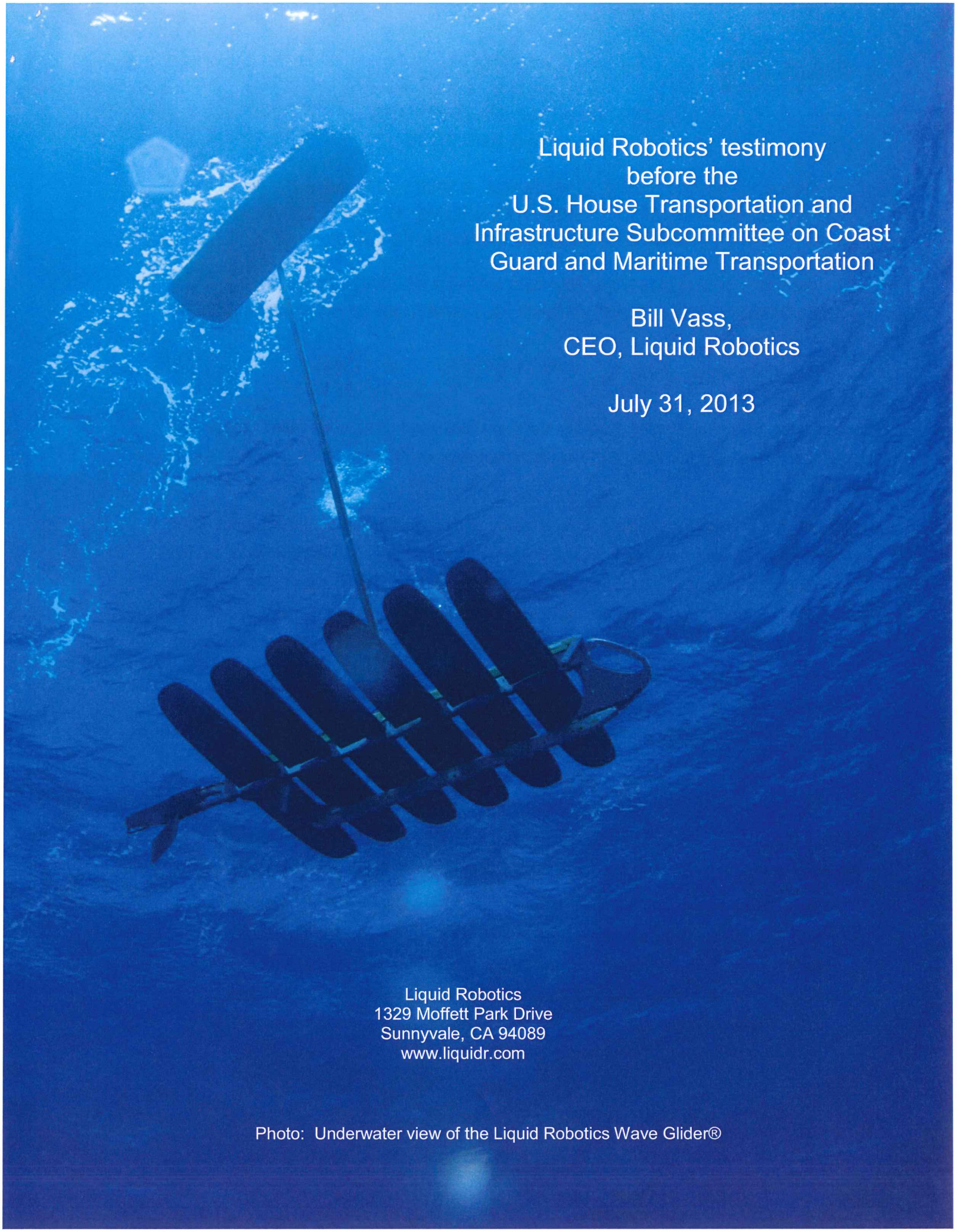

Liquid Robotics' testimony before the U.S. House Transportation and Infrastructure Subcommittee on Coast Guard and Maritime Transportation

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 INFRASTURCTURE 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 Salemo 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.