TESTIMONY OF
Tom Reynolds, Chief Strategy Officer, Seasats

On behalf of:

Association for Uncrewed Vehicle Systems International (AUVSI)

BEFORE
U.S. House of Representatives
Committee on Transportation and Infrastructure
Subcommittee on Coast Guard and Maritime Transportation
"America Builds: Maritime Infrastructure"

ON
February 5, 2025
10:00 AM
Washington, DC

Introduction

Thank you for the opportunity to testify today on the critical topic of our nation's maritime infrastructure. My name is Tom Reynolds, and I am the Chief Strategy Officer at Seasats and a Board Director with the Association for Uncrewed Vehicle Systems International (AUVSI). Seasats builds and operates high-endurance, user-friendly autonomous surface vehicles (ASVs) that collect data for defense, research, and commercial customers. I am testifying today on behalf of AUVSI, the world's largest nonprofit organization dedicated to the advancement of uncrewed systems, autonomy, and robotics. In addition to serving on the AUVSI Board of Directors, I am the founder of the association's Maritime Advocacy Committee (MAC), which represents more than sixty (60) companies in the robotics and autonomous systems (RAS) maritime domain. AUVSI represents a diverse range of stakeholders, including manufacturers, operators, and policymakers focused on integrating RAS across the air, land, and maritime domains and I am honored to sit on their Board.

I appreciate the Subcommittee's leadership in examining how our maritime infrastructure can support innovation, enhance safety, and strengthen economic growth. By way of background, I have over 22 years of operational and developmental experience with maritime unmanned systems.

I am a retired U.S. Navy Explosive Ordnance Disposal (EOD) Officer and the former Commanding Officer of the EOD and Diving Task Group in 5th Fleet and EOD Branch Chief at Joint Special Operations Command. I first began operating maritime robotics and autonomous systems (MRAS) in an experimental unit developing them in 2002 and led their first use in combat in 2003. I went on to conduct six (6) deployments to Iraq between 2003 and 2011, all of which included unmanned systems (maritime, ground or air).

I now have thirteen (13) years in industry dedicated to the design and manufacturing of MRAS. I was an executive in the largest unmanned underwater vehicle (UUV) company in the world and an executive with a leading U.S. shipbuilder.

My experiences in combat with uncrewed systems have forged in me a dedication to ensuring that as a nation, we lead the world in the integration of RAS to do the dirty, dangerous, and dull tasks, so that our men and women in uniform conducting important public safety and transportation missions are safeguarded from harm.

This is a very dynamic time for the U.S. Coast Guard (USCG). Recently, the Commandant was relieved. Shortly thereafter, the service was directed to initiate their biggest surge operation since World War II and more significant changes are predicted in the coming weeks. At present, the USCG is in lockdown status and recently conducted a daylong 3 and 4-Star Leadership Conference to assess immediate and long-term strategies.

With significant changes anticipated, I believe we have the opportunity to accelerate and integrate readily available RAS capabilities to meet the USCG's diverse mission needs and requirements. We must lay the groundwork for underwater, surface, and aerial autonomous capabilities coupled

with budget needs in support of encouraging the USCG's autonomous strategy completion and ensuring they have sufficient budget to test and implement their strategy.

As I mentioned before, I am testifying on behalf of AUVSI today. I, as a longtime AUVSI member with various companies and a current Board Member, commit the association to working with you to ensure that the United States has a robust maritime infrastructure and to ensure that the USCG has the resources it needs to be successful in achieving its mission and integrating autonomous technologies to supplement our men and women in uniform. It will be critically important for this Subcommittee to have robust oversight over the USCG, Maritime Administration (MARAD), and others as they develop key regulations. AUVSI is an important stakeholder to ensure industry's voice is heard when developing those key regulations moving forward and I encourage the members of this Subcommittee to take any and all opportunities to work with them and their members.

Outdated Regulations and the U.S. MRAS industry

Existing regulations are not compatible with the state of technology in the maritime industry. Currently, many of the regulations governing maritime operations result from centuries of maritime tradition of crewed vessels and do not adequately address the unique characteristics and operational requirements of MRAS. Until this is remedied, U.S. maritime regulations will continue to perpetuate uncertainty for manufacturers, operators, and investors, discouraging innovation and slowing the adoption of these transformative technologies.

Specifically, regulations need to be updated to address three key areas – development, certification, and the operation of MRAS.

1. **Development:** Current regulations require businesses to spend a significantly greater amount to test as sea than our international competition. Industry needs a testing regime at sea where MRAS can operate with no chase vessels, no human "lookouts", and limited liability.
2. **Certification:** Despite all the advances in sensors, artificial intelligence, and robotic reliability, regulations do not address a clear path to certifying MRAS for operations.
3. **Operation:** Industry has developed the ability to use MRAS safely and effectively for fisheries, hydrography, oil/gas, subsea mining, and environmental studies, however regulations restrict or lack clarity on how to operate these systems at sea.

The Role of MRAS in Modernizing Maritime Infrastructure

The introduction of MRAS is transforming the maritime transportation system (MTS). MRAS enhance efficiency, improve safety, and contribute to economic and environmental sustainability. However, realizing their full potential requires addressing key infrastructure, supply chain, and regulatory challenges.

1. **Port Infrastructure Development and Protection:**

   Ports and harbors face constant challenges from harsh marine environments and vessel activity, with underwater structures, including quay walls, pier supports, jetties, cables, and pipelines, at particular risk from corrosion, marine growth, and damage from ship traffic. MRAS operations can significantly augment existing inspection and security infrastructure, promoting resiliency and safety. However, many ports lack the facilities to support MRAS operations, including dedicated berths for MRAS, charging and fueling stations, and data integration systems. Programs like the Port Infrastructure Development Program (PIDP) and Rebuilding American Infrastructure with Sustainability and Equity (RAISE) grants are crucial to ensuring ports can accommodate both traditional and autonomous systems. Targeted investments can accelerate the deployment of MRAS, ensuring they seamlessly integrate with existing infrastructure and operational frameworks. Investments in UUVs and USVs are vital for critical infrastructure monitoring because they can operate autonomously in hard-to-reach and hazardous underwater environments.

2. **Aids to Navigation (ATONs):**

   As MRAS adoption increases, our navigation systems must evolve. Modernizing ATONs to include digital and autonomous communication systems will ensure MRAS can navigate safely and efficiently alongside manned vessels. The USCG's ongoing efforts in this area are critical, but additional resources are needed to expedite these advancements and procure and operate MRAS safely. The advancement of radar systems, automatic identification system (AIS) base stations, communication systems (e.g., satellites, radio systems, and camera clusters), and integrated bridge systems are important for the MRAS market to integrate into the manned fleets.

3. **Workforce Development and Standards:**

   The rapid integration of MRAS into the MTS brings tremendous opportunities for innovation and cost saving efficiencies. However, it also underscores a critical need for standardized training and certification programs for operators. Inconsistencies in training, safety protocols, and operational procedures hinder the full potential of MRAS technologies, potentially compromising safety, efficiency, and public trust.

   Industry-driven standards for MRAS training and certification are essential to addressing these challenges. Such standards create consistency across the sector, ensuring operators are equipped to handle complex missions while minimizing the risks of fragmentation and variability in training quality. By providing a unified framework, industry-led initiatives can enhance the safety and effectiveness of MRAS operations while fostering trust among stakeholders.

   AUVSI is taking proactive steps to address this gap through its MRAS Training & Certification Program. This collaborative initiative brings together stakeholders from

industry, academia, and government to develop common standards for safe and effective MRAS operation. The program aligns training with operational realities, safety requirements, and technological advancements, establishing a reliable foundation for workforce development across the sector.

Adopting an industry-driven program like AUVSI's offers numerous benefits, including the creation of a robust, industry-tested standard that can serve as a foundation for regulatory frameworks. These standards ensure that all MRAS professionals meet rigorous safety and operational criteria, providing consistency across training programs and practices. By aligning with proven methodologies, such a program offers regulators a practical, well-vetted model to incorporate into formal policies, streamlining the regulatory process and reducing duplication of effort.

Industry-tested standards also build public and regulatory trust by demonstrating a commitment to professionalism, safety, and accountability. They provide assurance that the MRAS sector is proactively addressing operational risks and prioritizing safety, which are critical factors for public acceptance of these technologies. Additionally, regulatory agencies can leverage these standards to create flexible policies that accommodate the rapid pace of technological advancement in the MRAS industry.

These standards enhance interoperability across platforms and organizations, a key requirement for operations in multi-stakeholder environments such as ports, defense applications, and disaster response efforts. Standardized procedures reduce the risk of miscommunication, operational errors, and inefficiencies, enabling smoother and safer collaboration. This interoperability is particularly vital in scenarios involving coordination across multiple jurisdictions or agencies, where consistent practices are essential.

Incorporating industry-driven standards into regulatory frameworks ensures that MRAS operations are not only safe and efficient, but also scalable. This approach supports the gradual expansion of MRAS technologies into new use cases and operational environments while maintaining oversight and public confidence. AUVSI's MRAS Training & Certification Program demonstrates the potential of this approach, offering a trusted model for accelerating the safe and effective integration of MRAS into the MTS.

These efforts will not only enhance operational readiness but also position the U.S. as a global leader in RAS, innovation, and workforce development.

4. **Shipbuilding and MRAS:**

The current state of U.S. shipbuilding presents a significant challenge to maintaining maritime infrastructure and operational readiness, particularly in producing large, crewed naval combatants. Shipyards across the nation are behind schedule for both building and maintenance. Traditional submarine shipyards/drydocks are at capacity as well. MRAS provides critical and practical support to this crisis. For both commercial and defense

operations, MRAS are ultimately more cost-effective vessels which can be built far more rapidly and at a fraction of the cost compared to traditional ships and warships. Unlike the constrained capacity of specialized shipyards required for building exquisite crewed naval combatants, the industrial base for USVs, UUVs, and undersea warfare crewed capital assets (e.g. SSNs) – from speedboats to two hundred (200)-foot ships – has far greater flexibility, with shorter lead times for supply chain components such as engines, electronics, and propulsion systems. MRAS offer procurement savings, lifecycle savings, scalability, adaptability, resilience and can be attritable – all differentiators in comparison to crewed undersea capital assets.

It is also important to note that the disparity in shipbuilding capacity between the United States and China is significant and has strategic implications for U.S. commercial and defense leadership. China's shipbuilding industry has a capacity approximately two hundred thirty two (232) times greater than that of the United States, enabling rapid expansion of its commercial maritime and naval capabilities.[1] According to a 2024 report by the Congressional Research Service (CRS), China's Navy is the largest in the world, with a battle force of over three hundred seventy (370) platforms, including major surface combatants, submarines, and aircraft carriers.[2] This fleet is expected to grow to three hundred ninety five (395) ships by 2025 and four hundred thirty five (435) by 2030.[3] In contrast, the U.S. Navy had two hundred ninety six (296) battle force ships as of August 2024, with projections to slightly decrease to two hundred ninety four (294) ships by 2030.[4] This vast industrial capacity allows China to build over 40% of large ocean-going vessels manufactured globally each year, totaling over one thousand (1,000) ships annually, compared to approximately ten (10) per year by the United States.[5]

Additionally, the supply chains that enable domestic shipbuilding face critical vulnerabilities, especially to Chinese extortion and export controls. For example, the United States is significantly dependent on China for rare earth magnets, which are essential components in the propulsion and guidance systems in every commercial and military vessel. There are currently no qualified domestic rare earth magnet manufacturers in the United States. The U.S.' ability to ensure a resilient shipbuilding base and maintain operational readiness requires significant attention and investment to onshore manufacturing of critical components like rare earth magnets.

---

[1] Congress.gov | Library of Congress: https://www.congress.gov/118/meeting/house/117481/witnesses/HHRG-118-ZS00-Wstate-PaulS-20240626.pdf
[2] CRS Report: https://crsreports.congress.gov/product/pdf/RL/RL33153
[3] CRS Report: https://crsreports.congress.gov/product/pdf/RL/RL33153
[4] CRS Report: https://crsreports.congress.gov/product/pdf/RL/RL33153
[5] Brooking: (https://www.brookings.edu/articles/to-expand-the-navy-isnt-enough-we-need-a-bigger-commercial-fleet

This substantial difference in shipbuilding capacity underscores the challenges faced by the U.S. in maintaining naval parity and highlights the strategic advantage held by China in maritime manufacturing. Investing in the scaled production of MRAS platforms can significantly enhance operational readiness while addressing supply chain constraints that currently hinder the production of larger crewed vessels. By integrating MRAS platforms into the shipbuilding framework, we can expand the operational capacity and resilience of our naval fleet in a cost-efficient and timely manner. Simply put, MRAS do not replace current technologies and operations but rather enhance them.

5. **Security of Maritime Infrastructure:**

   With power and communication cables, energy pipelines, and vital installations crisscrossing the seafloor, the need for continual monitoring and robust inspection practices is paramount. The maritime industry has over thirty (30) plus years with MRAS solutions to support subsea infrastructure protection. Investments should focus on industry solutions, especially UUVs and USVs, which are ideal for critical infrastructure monitoring because they can operate autonomously in hard-to-reach and hazardous underwater environments.

   UUVs can offer long duration, sustained presence, and a rotational force Concept of Operations (CONOPS) model for protection of critical undersea infrastructure protection. We have seen threats and vulnerabilities in the Baltic region and the North Atlantic Treaty Organization's (NATO) response with expensive crewed assets. There is significant opportunity for an uncrewed undersea presence and response with life cycle savings.

6. **Maritime Innovation:**

   The James M. Inhofe National Defense Authorization Act (NDAA) for Fiscal Year 2023 directed the Secretary of Transportation, through a competitive cooperative agreement, to establish a United States Center for Maritime Innovation (USCMI) to support the study, research, development, assessment, and deployment of emerging marine technologies and practices related to the MTS. Maritime innovation has been chronically underfunded and often supported in silos by government agencies related to the U.S. MTS according to individual agency priorities. The U.S. maritime industry stakeholders have had challenges in developing and maintaining high priority research agendas that address issues key to government and industry and executing aligned portfolios of research projects that engage multi-disciplinary, multi-organizational expertise that transcend parochial interests of individual institutions, organizations, and companies.

   The USCMI presents a unique opportunity to help build research priority alignment among government agencies and with industry, academia, and other stakeholders to best advance the interests of a more competitive, safe, secure, and environmentally friendly MTS. The USCMI also provides the collaborative forum to approach research in a new way – not just issuing competitive grants/contracts for project execution, but rather formulating

collaborative teams that bring together diverse stakeholders in new ways. The USCMI has been authorized and established, but needs additional funding to execute meaningful research, development, and demonstration projects in partnership with the industry to drive results for the nation.

Investing in U.S. Maritime Leadership

A robust U.S. maritime infrastructure is a cornerstone of economic and national security. As we modernize our ports, shipbuilding capacity, and regulatory systems, we must ensure that uncrewed systems are fully integrated into these efforts. Strategic investments in MRAS technology, workforce development, component supply chains, and infrastructure will position the United States as a leader in this transformative industry.

Conclusion

MRAS are entering the market on a global scale. These systems will be operating at sea regardless of the United States' participation in this technological evolution. As outlined above, this is for a good reason – MRAS offer unparalleled opportunities to enhance safety, efficiency, and sustainability in maritime operations while strengthening U.S. competitiveness and national security.

Until maritime regulations are updated to include the safe and responsible development, certification, and operation of USVs and UUVs, the United States shall remain a follower in the development of this technology.

AUVSI and its members are committed to partnering with Congress, federal agencies, and industry leaders to ensure the development of a robust ecosystem that supports the integration of these systems into our nation's maritime infrastructure.

With your continued leadership and support, the United States can solidify its position as a global leader in maritime innovation and maintain the strength and resilience of its MTS.