

Maritime Domain Awareness: To Know and To Act

by Edward Lundquist

Edward Lundquist retired from the US Navy in 2000. He is currently a senior science advisor with Alion Science and Technology where he supports the US Navy's Surface Warfare Directorate in the Pentagon. In this article he discusses the importance of information and intelligence as an essential element in taking action against anything in the global maritime domain that could adversely impact security, safety, economy or the environment.

Most of the Earth is covered by water, and the global economy is connected by the oceans, not separated by them. There are more than 20,000 ships over 300 tons under way right now. Add to that pleasure boats, fishing boats and other smaller craft. The amount of petroleum, bulk commodities, or containerized cargo at sea at this very moment is staggering. But there is also human smuggling, drug trafficking, gun running, weapons proliferation, crime, piracy and terrorism. How do we really know what's out there, and what do we do about it?

Maritime Domain Awareness, or MDA, is the effective understanding of anything associated with the global maritime domain that could impact security, safety, economy or the environment.

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MDA is both surveillance and intelligence, and requires a fundamental and thorough understanding of the maritime domain and its many dimensions. It does not merely focus on the thousands of vessels and boats at sea, but the cargos and crews, as well. Most importantly, MDA must tell us what doesn't belong on those ships, so that appropriate action can be taken. The US *National Strategy for Maritime Security* (NSMS) looks at MDA as "the ability to know, so that preemptive or interdiction actions may be taken as early as possible".

Most of these vessels are involved in international commerce, so the problem cannot be isolated as a national issue. Through a cooperative network that brings together

human intelligence, imagery, communications and other sources of information, a problem may be discovered on a vessel far from home waters. While it may appear to be a distant threat, it may transit through domestic waters or be bound for a domestic port. That problem must be dealt with as far from the home waters as practical.

The 200-mile Exclusive Economic Zone (EEZ) that surrounds the continental US, Alaska, Puerto Rico and a number of Pacific Islands such as Hawaii and Guam, is the world's largest EEZ. "A variety of sensors, analysis tools technologies and partnerships combine to guard our waters", says Curtis Dubay, the Coast Guard's director for MDA programme integration.

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The US Coast Guard is one of many agencies that participate in this layered approach to MDA. "We need to increase discoverability and access to information, to improve decision-making. Achieving and maintaining MDA is a complex process of observation, collection, fusion, analysis, dissemination and decisions, all of which must extend far beyond our borders, and even far from the edges of the US EEZs," Dubay says.

The Maritime Security and Safety Information System (MSSIS) shares non-classified Automated Information System (AIS) data between participating agencies and nations, using a simple but secure web-based, real-time data sharing system to enhance maritime safety, security and commerce.

Automated Information System

Today, all vessels of 300 tons and greater must have AIS, a maritime version of the Identification Friend or Foe (IFF) systems used to track aircraft movements. The AIS transponder provides information about the ship, course, speed, and destination. The transponder can be queried by other ships, satellites or land-based transceivers. Long-range identification and tracking (LRIT) systems help monitor the positions of



Maritime Domain Awareness requires an integrated approach between nations, navies and coast guards, law enforcement and other agencies at all levels, in places such as the harbour in Los Angeles [Edward Lundquist]

40,000 large commercial vessels anywhere in the world by satellite, and vessels of interest can be closely monitored for abnormal behaviour.

AIS is one tool that can be coupled with other information and intelligence to build an understanding of what is going on around an area of interest in the maritime domain. Dubai says AIS is a cooperative system, established under international standards, that provides a vital capability that can be used to enhance safety, improve security and enable better stewardship of the maritime domain. As an open broadcast system, it takes one of the first major steps in improving transparency. The recent advent of a commercial capability for receiving AIS from space will be an extremely valuable tool.

“Although we know we won’t see all vessels, AIS can help us better focus our efforts on the vessels that may pose the greatest threat. But AIS does not reveal their intentions. That is a more complicated problem,” Dubai says.

And there are new technologies becoming available, including space-based systems. “We know what the technology is,” says Guy Thomas, science and technology advisor for the National



Maritime Domain Awareness begins far from home waters; for example in the Port of Djibouti [Edward Lundquist]

Office for Global Maritime Situational Awareness (OGMSA) and the Global Maritime and Air Intelligence Integration office (GMAII). “We just need the political will to do it.”

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The various sensors, tools, systems and decision-making aids can be developed to look for anomalies in traffic patterns to identify suspicious contacts which might indicate a vessel involved in illicit trading activities. But many vessel movements look like anomalous behaviour at one time or another.

Taking Action

Rear Admiral Robert Parker, USCG, director of security and intelligence for the US Southern Command, says MDA requires operational knowledge and battlespace awareness across all four domains: maritime, air and space, land and cyberspace. Even with a great deal of very good intelligence, Parker says, there is still the matter of getting the right information to those who must act upon it. “How do we get the information you need to you when you are in a rigid hull inflatable boat moving to board a target of interest?”

What constitutes a threat? Is it one container carrying a dirty bomb on a ship with 5000 other containers? Is it a terrorist masked as a crew member on a supertanker? Is it a waterborne improvised explosive device on a pleasure boat in a busy harbour? The answer is that each of these is a true threat, but each carries unique challenges.

The maritime industry not only has a major stake in safety and security on the oceans, but the men and women at sea are a vital source of information. While many mariners are entrepreneurial, competitive and independent to the point of being ‘libertarians’, they do have a good sense for what does and does not belong at sea, as well a strong desire to keep the sea lanes safe and secure, says Captain Gordan Van E. Hook, US Navy (Retired), a senior director for innovation and concept development with Maersk Line Limited, the US flag entity of the A.P. Moller-Maersk Group. According to Van Hook, there are a million professional seafarers. Wherever there are professional mariners on the sea, there is a bubble of awareness of what is within their visual and radar range. “A company such as Maersk, with a thousand ships, each a bubble of awareness, can contribute to the overall maritime domain awareness.”

“The mariners at sea are the first line of defence for safety, security and the environment,” says Kathy Metcalf, director of

maritime affairs for the Chamber of Shipping of America.

“We rely on the people who live and work here, the way a community relies on a neighbourhood watch,” says Captain Leon Nixon, chief of the Port of Los Angeles Police Department. “We visit the bait piers and talk to the fishermen. We hear from the residents who live aboard their boats in the marinas. They’ll tell us if something doesn’t look right.”

Fusion Centre

The National Maritime Intelligence Center (NMIC) is the central point of connectivity to fuse, analyse, and disseminate information and intelligence for shared situational awareness across classification boundaries.

Smaller commercial vessels and pleasure craft less than 300 tons represent a different and more pressing challenge. While there are about 80,000 ships above 300 tons operating in some capacity today around the world – mostly registered, regulated, inspected and tracked – there are nearly 13 million registered recreational vessels and another 8 million non-registered recreational vessels in just the US alone, along with another 80,000 fishing vessels and thousands of other commercial vessels. The overwhelming majority of pleasure craft and small commercial vessel operators are responsible and law-abiding. But a small, seemingly innocuous vessel has tremendous potential to deliver dangerous people, or weapons of mass destruction.

Maritime domain awareness is all about building a better picture – and then using the picture better

A small boat, packed with explosives, was responsible for the damage to USS *Cole* in Yemen, and the French supertanker M/V *Limburg* in the Gulf of Aden. “If you consider what a small boat did to the USS *Cole*, then you can understand why I say there is nothing that worries me more than a waterborne improvised explosive device in one of our ports,” says Admiral Thad W. Allen, Commandant of the Coast Guard.

“Every Coast Guardsman is a potential sensor,” says Dubai. “MDA supports operational decision-making across every mission area of the Coast Guard – from saving people at sea and enforcing laws and treaties to securing our ports and waterways from maritime threats. Helping to increase our understanding of activities in the maritime domain is everyone’s job. Sensors and technology provide an important part of the picture, but the observations, knowledge and experience of our people in the field and in our operations, analysis and fusion centres are absolutely crucial to success.



It is important to obtain the help and cooperation from people who make their living on the water to know what’s going on. This water bottle, as well as a first aid kit, given to crew members of the many dhows in the Northern Arabian Gulf, ask for their assistance in identifying suspicious activity [Edward Lundquist]

Maritime domain awareness is all about building a better picture – and then using the picture better,” Dubai says. “Situational awareness alone doesn’t provide complete and effective understanding, nor does it allow a commander to position forces optimally to meet a potential or emergent threat. Rather, this awareness must be combined with up-to-date intelligence and threat analysis. In that way, we hope to respond to threats before they occur and as far away from our shores as possible”.

“It isn’t enough to know what’s out there at any given time. To be effective, we must be able to conduct persistent monitoring of the maritime domain anywhere on the globe,” says Dubai. ■