Future of Maritime Security:
Role of Science, Technology & Space

By Cung Vu

Synopsis

No single country is seen as being able to secure the maritime domain alone. Collaboration and information sharing with partner nations can help to detect, identify, track, and interdict nearly all vessels approaching coastal areas. Space systems utilisation and information sharing are the right steps.

Commentary

THE MARITIME domain is the lifeblood of the global economy handling approximately 90% of the world's trade. World-wide maritime activity includes more than 30,000 ocean-going ships of 10,000 gross tons or greater, most of which are underway at any given time and operated by over 150 different national flags.

The world's economic engine has evolved into a finely tuned just-in-time delivery. It is no longer efficient or economical for businesses to invest in on-hand inventories of goods and materials due to the vastly increased efficiency and dependability of the modern intermodal Global Supply Chain (GSC). However, these advances in shipping technology and reliability have also resulted in economic vulnerability borne of a lack of resiliency to any long-term disruption of supplies and goods including oil and natural gas.

Information sharing and space systems utilisation

As a result of Sept 11, the US conducted a counter-maritime terrorism study to determine where maritime vulnerabilities were and what could be done to counter them. The efforts resulted in a set of requirements, the first of which was to find a better way to detect, identify and track all ships approaching the shores of the United

States. The Automatic Identification System (AIS) was a system designed to prevent collision which all ships over 300 tons (about 100 feet) engaged in international commercial endeavours were required to commence carrying by 2004. By late 2001, some ships had begun to carry AIS. Its signal contains 29 data fields such as name, Mobile Maritime Service Identifier, International Maritime Organisation number, position, course, speed, heading, etc.

Subsequently, the US Department of Transportation, NATO and the US Navy developed the Maritime Safety and Security Information System (MSSIS) to make data sharable. Its features include commercial AIS equipment, shares unclassified maritime data worldwide, simplicity and open architecture. Authorised users gain access through commercial security networks of the Navies, Coast Guards, agencies, ministries, border police, and port authorities. Up till 2014, 73 nations were participating in MSSIS.

The rising tide of information and role of space

So what are the challenges still? There are about 180,000 vessels that meet requirements to broadcast AIS. Out of an estimated 17 million registered vessels in the world, less than 1% of all registered vessels are routinely tracked. Navigational radar is trending toward low-power solid-state electronics, difficult to receive and traffickers are turning toward semi and fully submersible craft for high-value cargo.

How could we detect vessels of interest? Are they foreign military vessels, poachers, traffickers or illegal waste dumpers? To do this, a staggering amount of maritime data must be processed to detect threat-related behaviour.

Unlike in the past when the maritime domain was slower, we have to do this on an ever-quickening basis daily. The reality is we cannot approach this rising tide of information by building more servers or increasing personnel in an attempt to keep up. One of the options is to utilise the capability from space.

Space brings an unparalleled perspective of the world and allows us to detect ships far from land or other ships and days from their destination. Maritime activity that was once out of sight can now be seen – even identified from space and anywhere on Earth. In the civil and commercial sectors, there are approximately 70 electro-optical imaging satellites from 28 countries, 11 synthetic aperture radar satellites from six countries, and 12 Automatic Identification System (AIS) satellites from five countries.

There are benefits to utilising these commercial satellites as they are available where it used to be only in national systems are now available to every agency and department. Civil and commercial imagery and data are unclassified, and can be shared. The cost of space-based imagery and data are approaching "commodity" price levels. Ship detection, classification, fusion with ship meta-data, threat evaluation, risk assessment, and visualisation are becoming automated.

SILO and the future of maritime security

Achieving cost-effective maritime domain awareness depends on being able to

discern trends and recognise anomalies in activities. But data alone are insufficient; it must undergo collection and processing before the resulting intelligence is disseminated to all who need to know so that proper initiative can be taken against predicted threats.

One example of such information sharing effort is called the Single Integrated Look-out List (SILO), an initiative developed by the US National Maritime Intelligence-Integration Office (NMIO) to facilitate the exchange of Vessel of Interest (VOI) information. SILO provides Intelligence and/or Operations Centers around the world with a comprehensive list of vessels of interest.

According to NMIO, this method of information sharing currently grants 48 nations access to certain data, while the original data owners still have jurisdiction over what is being shared and with whom. SILO allows analysts to look up information on over 240,000 vessels, including ship characteristics, blueprints, and movement history. Additionally, it gives the user the ability to perform a variety of actions such as creating alerts on vessels, viewing other VOI lists, and even providing automated alerts when VOIs enter specific regions.

The world today is very different. We are indeed better protected, more secure, and more resilient. However, no single country is seen as being able to secure the maritime domain alone with respect to detect, identify and interdict vessels approaching its coast lines. We should collaborate and share information with partner nations to have an effective maritime domain awareness. There is no silver bullet, but space systems utilisation and information sharing are the right steps.

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