IDSS PAPER

15 January 2026

Closing the Gap

AI-Enabled Maritime Domain Awareness in Southeast Asia

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www.rsis.edu.sg No.010– 15 January 2026

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KEY TAKEAWAYS

- *Southeast Asia's maritime domain awareness (MDA) build-out is advancing on sensors and coverage, but the emerging capability gap is in decision speed and the routine integration of AI-enabled fusion and decision support.*
- *AI-enabled MDA can deliver near-term operational gains in Southeast Asia across three important operational areas.*
- *Closing the gap will require sustained work on institutional alignment, data governance, and the operating procedures that determine how information is validated and acted upon.*

COMMENTARY

20 years ago, maritime operations centres (OPCENs) monitored busy waterways using a limited set of inputs: intermittent AIS signals (radio transmissions from ships using very high frequencies), delayed patrol reports and sporadic updates from partner agencies. Maritime awareness often ended at the edge of radar coverage, leaving large areas poorly monitored.

Today, the same OPCENs operate in a far denser information environment, reflecting the promise of AI-enabled maritime domain awareness (MDA) platforms to support faster and more predictive maritime awareness. Fused radar and AIS tracks, satellite imagery, and increasingly sophisticated analytics allow operators to prioritise attention rather than manually scanning thousands of contacts. Decision support tools can flag patterns that warrant closer scrutiny, such as unusual loitering, inconsistent vessel

identities, or movements that diverge from established routes. This advantage compresses the time required to validate cues and enables more timely operational responses across territorial waters and adjacent seas. In regions with mature MDA ecosystems, AI-enabled fusion and decision support have advanced quickly, raising the benchmark for what effective MDA entails.

In Southeast Asia, however, AI-enabled analytics have yet to be integrated into routine maritime operations. While regional states are rightly investing in foundational MDA architecture – sensors, platforms, and wider coverage – capability is increasingly defined by decision speed: the ability to validate, coordinate and task responses before operational windows close. If analytics integration is deferred, the region risks narrowing today's coverage gaps while allowing an analytics gap to widen. Southeast Asia should therefore pursue a parallel track: continuing infrastructure build-out while establishing the data governance, interoperability and operational workflows required to operationalise AI-enabled decision support.

From Coverage to Decision Speed: Where the Real Gap Now Lies

MDA capability can be understood as a linked chain of functions. It begins with coverage and collection, establishing baseline awareness through sensors, platforms, and connectivity. It then moves to fusion and interoperability, determining whether data can be correlated with sufficient confidence to justify action. The third function pertains to the decision-cycle speed – whether maritime OPCENs can translate cues into timely operational responses. The final function is sustainment and skills, ensuring that analytics remain credible through maintained data pipelines, technological currency, and retained expertise. Collection upgrades are often the most straightforward to deliver. The other functions, by contrast, depend heavily on institutional alignment and sustained data practice.

Regional modernisation efforts reflect this emphasis on collection. Indonesia is developing a National Maritime Security System to link command centres and integrate multi-sensor inputs. Malaysia is widening its radar coverage under its Maritime Surveillance System (SWASLA), including in East Malaysia and along the eastern seaboard of Peninsular Malaysia. The Philippine Navy is set to receive coastal radar systems through Japan's Official Security Assistance. Vietnam continues to tighten vessel-side data collection through mandatory vessel monitoring systems.

Yet, MDA performance is increasingly determined above the collection layer. Constraints are often institutional rather than technological: fragmented mandates delay coordination, uneven digitalisation undermines data confidence, and sovereignty sensitivities constrain escalation. AI-enabled analytics can help by prioritising attention and accelerating correlation, generating cues that operators can validate within existing command structures.

Three operational areas illustrate where this balance matters most: Illegal, Unreported, and Unregulated (IUU) fishing, Search and Rescue (SAR), and the protection of Critical Underwater Infrastructure (CUI).

Where AI Can Deliver Near-Term Operational Gains

Illegal, Unreported, and Unregulated Fishing

IUU fishing remains one of Southeast Asia's most persistent maritime challenges. OPCENs must screen dense traffic to identify a small subset of behaviours that warrant review, often with incomplete signals, deliberate concealment, or patterns that only become suspicious over time. AI-enabled MDA can support this task by transforming large, fragmented data streams into prioritised cues, such as surfacing anomalous loitering, suspicious rendezvous patterns, or behaviours consistent with illegal transhipment. This approach is already visible in maritime analytics platforms that combine vessel tracking with AI-enabled behaviour modelling at scale, such as the Allen Institute for AI's Atlantes, which analyses vessel behaviour in near-real time using GPS data. The operational value for Southeast Asia is not that AI "solves" IUU fishing, but that it improves lead generation and compresses the time between detection and tasking.

Search and Rescue

SAR remains critical in Southeast Asia's dense and operationally complex maritime environment. Here, the priority is rapid detection and search-area reduction under severe time pressure. AI-enabled cueing can help flag small objects or weak signals that are difficult to detect consistently through manual routines, especially at night or in cluttered conditions. Commercial platforms such as SEA.AI demonstrate how thermal and optical sensing with computer vision can surface small craft or persons overboard that may not be visible to radar or AIS. The United States Coast Guard's Project Minerva similarly employs drones using computer vision and machine learning to detect surface targets across vast maritime areas.

Critical Underwater Infrastructure

The protection of CUI – subsea cables, pipelines, and offshore energy installations – has emerged as a strategic concern because these assets are both essential and difficult to monitor continuously. Risks often appear first as weak signals: ambiguous behaviour that is difficult to interpret within existing response thresholds. AI-enabled monitoring adds value through correlation and early warning, particularly when surface patterns and subsea indicators are fused into prioritised cues for investigation. In Europe, where subsea infrastructure protection has become a defined policy priority, this has begun to translate into programmes aimed at improving monitoring and early warning, such as the EU-funded Project VIGIMARE.

Governance Readiness Matters as Much as Technology

The effectiveness of AI-enabled MDA hinges on arrangements beyond the OPCENs alone. Data access and sharing across different stakeholders are critical, as are the broader regulations and procedures that enable these exchanges. Agencies will also require defined procedures for investigation and escalation that specify who acts and how coordination is managed across jurisdictions. Without these arrangements, improvements in detection may not translate into any practical outcomes.

On AI governance specifically, Southeast Asia is not starting from zero. At the regional level, the ASEAN Guide on AI Governance and Ethics, together with its expanded guidance on generative AI, provides a shared reference point on risk, governance, and accountability that can be adapted to maritime command and inter-agency contexts. National initiatives such as Malaysia's National Artificial Intelligence Roadmap and Indonesia's National Strategy for Artificial Intelligence similarly frame AI development as a governance challenge rather than a purely technical one.

Integrating AI-enabled analytics into routine maritime operations in Southeast Asia will require sustained attention to institutional alignment, data governance, and operational workflows.
Image generated by the authors using ChatGPT.

The central question is whether Southeast Asia can integrate AI-enabled analytics into routine maritime operations as it continues to invest in sensors and platforms. MDA capabilities are increasingly defined not by how much data is collected, but by how quickly information can be fused, attention prioritised, and cues translated into timely tasking and response. Closing this gap will require sustained attention to institutional alignment, data governance, and operational workflows – areas where technology alone is not sufficient, but can act as a human enabler if embedded well.

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