

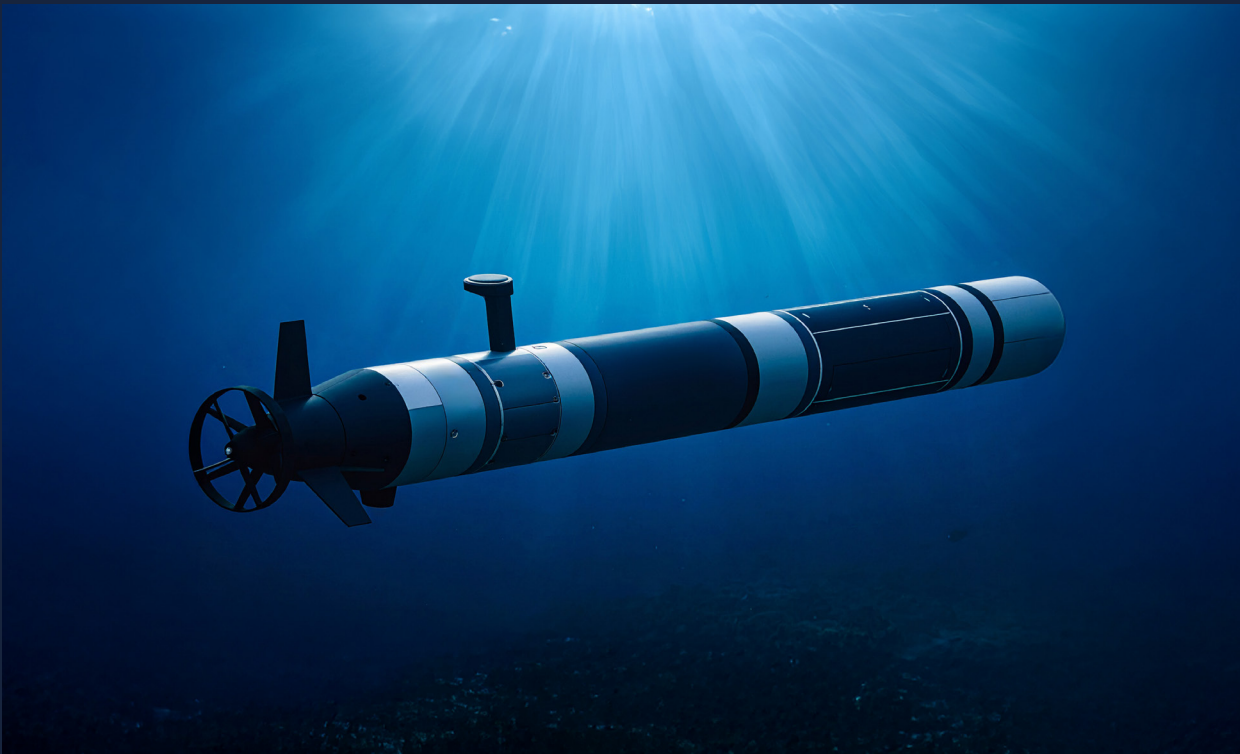
# Maritime Autonomous Systems

Welcome to part three of our primer series on autonomous systems, following on from the autonomous land and air systems primers we've already released. In this edition, we head to the waterline to explore everything you need to know about Maritime Autonomous Systems (MAS).

## So, what exactly do we mean by MAS?

Maritime Autonomous Systems refer to uncrewed platforms that operate on or under the surface of the sea without an onboard human presence. These include Uncrewed Surface Vessels (USVs) and Uncrewed Underwater Vehicles (UUVs), each typically integrated with navigation systems, payloads, communications, and

supporting infrastructure, much like their airborne and landborne counterparts. These platforms can range from small torpedo-sized underwater drones to full-sized vessels capable of months-long deployments. Control can be direct via remote operators, semi-autonomous, or fully autonomous with onboard AI and sensor systems.



The roots of maritime autonomy reach back further than you might think. As early as World War II, navies experimented with remotely controlled boats for minesweeping and target practice. In the Cold War era, the US and Soviet Union both developed underwater vehicles for intelligence gathering. However, it's only in the last decade that we've seen a real leap forward in terms of autonomy, endurance, and adoption.

Today, MAS are in active service around the world. Militaries use them for a whole range of activities such as mine clearance, anti-submarine warfare, ISR (intelligence, surveillance, and reconnaissance), and logistics support.



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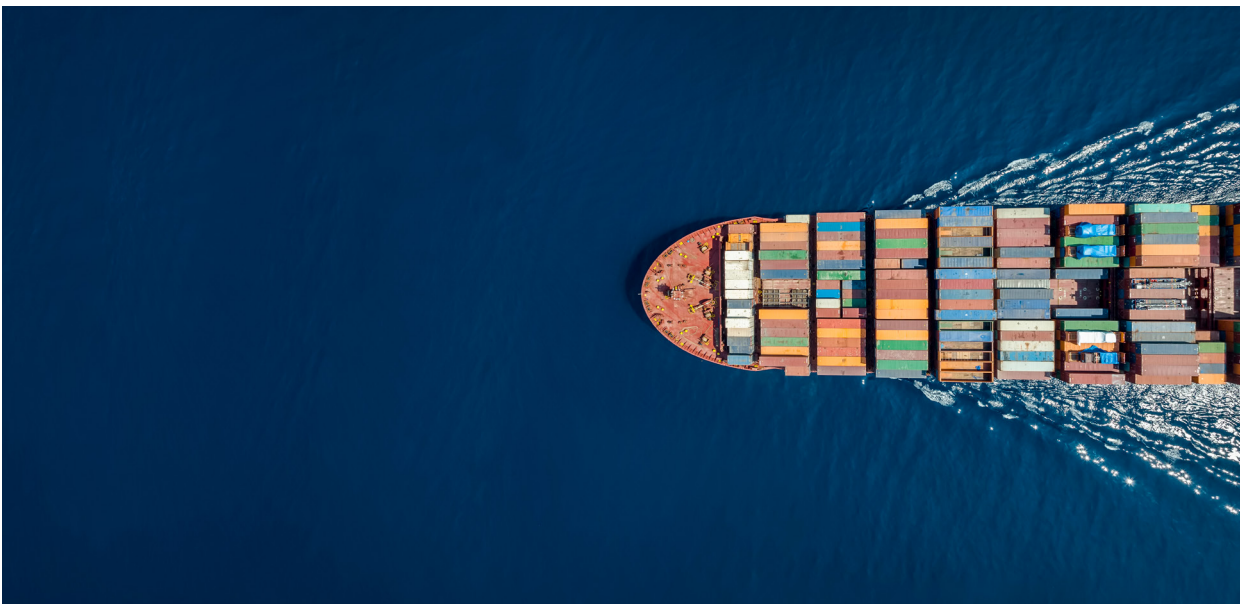
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The UK has taken a leading position in maritime autonomy, with the Royal Navy actively developing and fielding a new generation of autonomous maritime platforms. Central to this effort are programmes like NavyX, the Royal Navy's autonomous systems accelerator, trialling platforms and working closely with NATO partners in joint experimentation to bring new innovation to the seas more quickly. The initiatives under NavyX (and other parts of the Navy and UK Special Forces) align with the UK's Future Maritime Aviation Force (FMAF) and the Strategic Defence Review's ambitions and are seen as crucial to remain relevant in a world that is going to be dominated by one nation's ability to project power of this sort over others.

It's not all about military applications though. In the commercial and civil world, MAS are transforming offshore energy, environmental monitoring, and marine science. Autonomous systems are increasingly used for oceanographic data collection, uncrewed cargo transport, and smart port operations. MAS are also being used for underwater search and recovery, pollution mapping, and post-disaster infrastructure inspections.

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### So where is all this taking us?

In Heligan's view, autonomy and AI will play defining roles in navigation and operations (both military and civil), even in GPS-denied environments. Maritime swarming concepts are emerging from the conflict in Ukraine, and advances in propulsion and underwater communication are unlocking new opportunities. Regulatory frameworks are starting to evolve that are slowly allowing MAS to safely operate in shared waters alongside crewed ships, but as with all legislative and regulatory construct, these are not moving at the pace of innovation and are seen as a brake to progress. Countries like Norway and Japan are leading the way and demonstrating what aligned innovation and regulation can

achieve. They are already conducting sea trials of autonomous commercial vessels. Automated ferries and smart navigation systems are now more than just prototypes, they are real and operational.

It's clear that there is no going back, like we've seen in Uncrewed Aerial Systems (UAS) and Uncrewed Ground Systems (UGS) in the air and terrestrial sectors, MAS will continue to reshape maritime operations across defence, science, and commerce. With increased efficiency, safety, and capability, they are here to stay.

It looks as though we are going to have to learn how to ride this new wave to stay ahead!