Autonomous Warrior 22

Two-week exercise in Jervis Bay advances innovative maritime technologies, **LCDR Andrew Herring** reports.

EXERCISE Autonomous Warrior 2022 has been a great success with significant advances made in Navy's exploration of autonomous and unmanned systems in collaboration with allies, partners and industry.

Director General of Warfare Innovation Navy, CDRE Darron Kavanagh, reflected on the two-week operational experimentation (OPEX) exercise — the largest conducted in Australia focused on remote and autonomous systems (RAS-Ai) — as it drew to a close at HMAS *Creswell* at the end of May.

"We have managed all of the major outcomes that we were trying to achieve and we have been able to engage with industry to actually bring them along with our continuous experimentation program and improve our sovereign capability," CDRE Kavanagh said.

This year's exercise brought together more than 40 organisations and around 300 people in locations across three countries.

It provided opportunities for industry engagement including exhibits, presentations, networking functions, regulatory workshops and standalone technology demonstrations.

"Autonomous Warrior 2022 has been a staged event where we've started with a 'crawl' approach where we've actually started with individual elements of the technology and made sure that they were working correctly," CDRE Kavanagh said.

"We then went into the 'walk' stage, where we started to bring that equipment together to work in a more coordinated fashion and then we've finished up with a 'run', where we've actually had them integrated and been able to show a full command and control approach on how to manage these systems for full effect."

Autonomous Warrior 22 was also the venue for the official launch of Navy's RAS-Ai Campaign Plan 2025.

Launched by Head Navy Capability, RADM Peter Quinn and DSTG Maritime Division Chief, Professor Emily Hilder, the plan sets out a pathway to achieve rapid delivery of RAS-Ai capability to maintain Navy's edge in a dynamic strategic environment.

RADM Quinn highlighted the increasing pace of change and the opportunities for closer cooperation in autonomous systems created by the AUKUS partnership.

Professor Hilder emphasised the importance of collaborating with industry to define future needs and build sovereign capability.

"RAS-Ai capability, developed and employed by an innovative and dedicated workforce, epitomises a *Thinking, Fighting and Australian Navy*," RADM Quinn said.

MARTAC Mantis T38 Devil Ray unmanned surface vehicle operates with safety personnel on board in the waters of Jervis Bay during Exercise Autonomous Warrior 22.

CDRE Kavanagh said the exercise enabled progress in developing command and control systems for future operational use.

"It also helped mitigate risk in current RAS-Ai projects and built skills across Navy, the Defence Science and Technology Group and industry," he said.

The exercise also deepened Navy's collaboration with allies and partners, particularly the United States, the United Kingdom and New Zealand.

"We've been able to work with our allies and partners to actually increase our capability in terms of not only interoperability but interchangeability of these really important robotic and autonomous systems," CDRE Kavanagh said.

"Demonstrating a closer ability to work together with our allies and partners is necessary as we move forward into a more continual collaborative RAS-Ai experimentation program into the future."

WRITING RULES FOR ROBOTS

LCDR Andrew Herring

WHILE experimentation with robotic and autonomous systems continued in Jervis Bay during Autonomous Warrior 22, representatives from Defence and civilian regulatory bodies, academia and industry gathered at HMAS *Creswell* to consider how to regulate the new technologies.

About 60 invited experts attended two days of regulatory workshops to grapple with how to adapt to disruptive RAS-Ai technologies.

In opening the workshops, Director General Warfare Innovation Navy, CDRE Darron Kavanagh focused on the challenges ahead of regulators.

"Autonomy is transformative in the delivery of effects and it requires a disruptive approach to implement and maximise the benefits," CDRE Kavanagh said.

"The Defence organisation is optimised for incremental improvements rather than rapid transformation."

He spoke about the need to challenge conventional interpretations of the application of regulations that are often centred around 'crewed' platforms to ensure human life is preserved. Workshop participants were asked to approach the issues with an open mind, being prepared to adapt quickly and not to focus on individual systems or technologies.

"For autonomy to have an effect and be accepted it needs to operate in a way that reflects our values so it can be trusted and controlled," CDRE Kavanagh said.

Although the workshop only began the long and complex task of regulating new robotic systems, it was first time all the bodies represented had gathered together and underlined the need for Defence to continue engaging with civilian regulators and independent experts.

Ken King demonstrates the capabiliti[es] Unmanned Air System during Exercis[e]
Photo: POIS Justin Brown
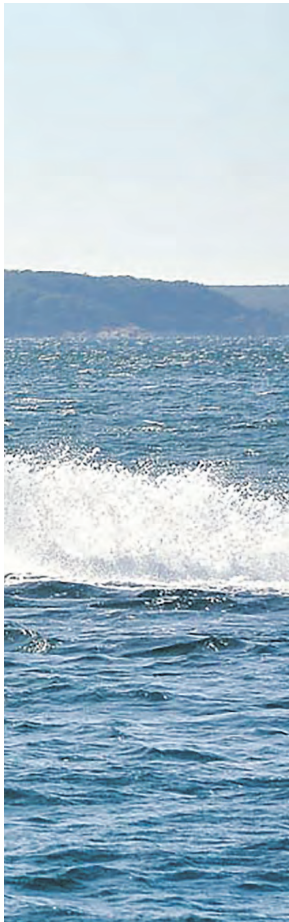
INSIDE THE TECH

Uncrewed surface vessels

Uncrewed surface vessels are designed to remain at sea for months at a time, operating a range of sensors for surveillance, communications relay, mine counter measures or anti-submarine warfare.
The Australian-developed Ocius Bluebottle (*left*) and the US-developed Saildrone Explorer were in operation at Autonomous Warrior 22.
The Ocius Bluebottle is currently in service with Australian Border Force and is used to conduct fisheries surveillance.
The Saildrone Explorer is in service with the US Navy patrolling the Arabian Gulf.

Remus Autonomous Underwater Vehicle

The Remus Autonomous Underwater Vehicle (*right*) is a proven system that continues to evolve.
Several Remus variants were operated at Autonomous Warrior 22 by DSTG and Navy's Maritime Geospatial Warfare Unit.
Depending on the Remus variant being employed, it can operate at depths in excess of 100 metres and is equipped with a range of sensors and imaging equipment that can be configured to meet a variety of missions.

Extra large order

Edwina Callus

DEFENCE has partnered with global tech company Anduril to design and develop extra-large autonomous undersea vehicles (XLAUVs).

Under the co-funded arrangement, Defence scientists, Navy personnel and Anduril robotics specialists will produce three prototype XLAUVs over three years, delivering a manufacture-ready vehicle at the end of 2025.

XLAUVs are typically between 10 and 30 metres long and have the capacity to carry various military payloads over long distances.

In addition, a large diameter autonomous undersea vehicle will be delivered to Australia as a testbed vehicle to enable experimentation, testing and validation to commence from the first quarter of next year.

It is expected that ongoing initiatives to broaden Australia's uncrewed undersea vehicle industry will ensure Australia is at the forefront of robotic autonomous systems.

Chief Defence Scientist Professor Tanya Monro said the collaboration was significant, not only for the critical capability it would deliver to Defence, but because it demonstrated how innovative new technology could be fast-tracked and to keep pace with the changing strategic environment.

"We have long recognised in Defence that we need to transition innovative concepts into capability more quickly. That urgency to deliver impact is what shapes our Defence innovation programs, and is the driving force behind More, Together, our 10-year Defence science and technology strategy," Prof Monro said.

"Our new approach to innovation is all about focus, scale and impact.

"By partnering shoulder to shoulder with our industry and Navy colleagues to co-develop this critical capability, that is exactly what we'll achieve."

The ambitious XLAUV development program will establish the foundations of an Australian sovereign XLAUV capability while strengthening Defence's understanding of the technology associated with operating these platforms.

The project is partly funded by Defence's Next Generation Technologies Fund.

"This is a great example of our innovation system in action and exactly the sort of activity that the Next Generation Technologies Fund was designed to enable,' Prof Monro said.

Head Navy Capability RADM Peter Quinn said the program would focus on the capability first, and use technology to find solutions to problems.

"We will build a little, test a little and learn a lot," RADM Quinn said.

Executive chairman and CEO of Anduril Australia, David Goodrich, said through this important partnership, Anduril Australia would become a major player in the thriving defence industrial base in Australia and contribute to Australia becoming a leading exporter of cutting-edge autonomous capability to the world.

The XLAUV program is directly aligned with Defence's strategic research activity, the Remote Undersea Surveillance STaR Shot, a mission-directed research program.

They have the potential to provide the ADF with an important, stealthy, multi-role, undersea capability, complementing and enhancing the agility and potency of the Navy's current fleet.

...s of the Freespace operations Callisto 50 ... Autonomous Warrior 2022 at HMAS *Creswell*.

Bluebottle joins Devil in a sting

LCDR Andrew Herring

SEVERAL autonomous systems 'teamed up' to protect Jervis Bay from an intruder last month as exercise Autonomous Warrior 22 reached a dramatic climax.

In a complex maritime surveillance and interdiction scenario, several systems were tasked with preventing a suspect vessel — played by a Steber work boat — from entering Jervis Bay undetected.

An unmanned aircraft conducting autonomous aerial patrols over the bay detected the would-be intruder and directed the Ocius Bluebottle and Saildrone Uncrewed Surface Vessels (USVs) to maintain surveillance while the high-speed MARTAC T-38 Devil Ray autonomous surface vessel raced to intercept it.

Meanwhile, ashore, the mood among command and control systems operators was intense as they worked to achieve more seamlessly integration than at any previous point in the two-week exercise.

Fortunately, the rogue vessel was detected, captured and escorted safely into port to be handed over to "authorities".

Key to this exercise scenario was the teaming between autonomous systems, and the role played by the 38-foot long T38 Devil Ray vessel.

The vessel was acquired by the Australian Defence Force shortly before Autonomous Warrior 22 for ongoing collaborative experimentation with autonomous teaming concepts.

It carries its smaller twin, the 12-foot long MARTAC T12 autonomous surface vessel.

The smaller vessel nests in its larger mother vessel, which deploys it so the two vessels can operate as an autonomous team to achieve a wide range of missions.

Australia will now continue collaborating with US, UK and New Zealand armed forces who have also acquired variants of the innovative vessels for experimentation purposes.