



Testing and pushing the boundaries of maritime autonomous systems (MAS)

Executive summary

QinetiQ played a central role in the delivery of REPMUS 19 – a multinational demonstration of maritime autonomous systems (MAS), designed to enable national members of the NATO Maritime Unmanned Systems initiative, MUS, explore the effective use of new unmanned capabilities, guiding investment decisions and development work. We applied expertise and relationships acquired through many previous demonstrations to execute the project safely, successfully and at pace. The exercise led to a number of important advances, in particular around the integration of MAS.

The brief

NavyX, the UK Royal Navy's autonomy accelerator, has an ambitious programme of operational experimentation, moving MAS technology at pace towards fielding. As the centrepiece of the 2019 programme, NavyX required a large-scale collaborative demonstration of unmanned systems in the maritime environment. Keen to demonstrate the progress that had been made since Unmanned Warrior in 2016, our customer wanted wide participation within what was to be a genuinely international exercise.

The activity, a mix of experiment and demonstration, was given the NATO title REPMUS 19. Taking place alongside an existing NATO exercise in Portugal, it was given stretching objectives to test interoperability and drive greater user involvement and tactical realism, progressively honing operational concepts.

The brief required rapid mobilisation with less than six months from initial discussions to execution. QinetiQ had a broad scope of responsibility, from design through to integration, trials management and overall safety – with all activities conducted on the Atlantic coast in Portugal.

Our solution

Many of the QinetiQ team had played an instrumental role in previous demonstrations – Unmanned Warrior 2016, Autonomous Warrior 18 (in Australia), Autonomous Advanced Force (AAF) and Cardigan Bay 19. In addition to continuity, this gave us the unique experience and expertise needed to make fast and significant progress. We knew where the key challenges were and could help our customers identify clear experimentation objectives and the best placed equipment components.

Working with partners from across the maritime enterprise, alongside international players including the US Navy, the Portuguese Navy and NATO, we took the brief and produced a series of challenging and highly relevant operational scenarios and vignettes. These were developed and agreed with the end-user community, and key assets were allocated.

At the heart of our solution was the MAPLE (Maritime Autonomous Platform Exploitation) command and control demonstrator, which is designed to integrate multiple unmanned systems and ensure data fusion into an operational combat management system. MAPLE is a QinetiQ-led collaboration with Dstl, BAE Systems, Seebyte and Thales.

Our team worked with vehicle and payload providers to ensure the information architecture would support the planned activity, and developed a comprehensive integration and de-risking plan. Using the Long Term Partnering Agreement (LTPA) with the MoD, we developed a fully-costed proposal which enabled rapid contract action ahead of a rapid and challenging integration programme. This including de-risking using the MAPLE synthetic environment, and shipping out the systems to Portugal in good time.

Following a set up and integration week, the exercise built progressively in pace and ambition before concluding with a highly successful visitors' day that attracted intense media interest.

REPMUS involved around 800 personnel from the Portuguese Navy, as well as representation from Belgium, Italy, Poland, Turkey, the UK and the US, and the NATO Centre for Maritime Research and Experimentation. It was supported by academia and industry.

Outcomes and benefits

The work we did to deliver REPMUS attracted international interest and high praise for and from NavyX. The exercise was a major undertaking which exhibited our ability to operate with partners at pace: we executed the project from contact award to delivery in less than four weeks.

REPMUS was the first large scale unmanned experiment conducted collaboratively by NATO and led by the multinational Maritime Unmanned Systems (MUS) Initiative. It provides a benchmark for conducting future exercises as part of a wider push into disruptive technology, as well as an effective model for connecting operational communities with industry and academia to develop and test operational concepts and requirements.

The ever-increasing maturity and openness of the MAPLE platform played a key part in the experiment's success.

A number of major advances were achieved at REPMUS, including:

- Much greater integration of MAS – including digital command and control of assets undertaking mine countermeasures, surveillance and reconnaissance, anti-surface warfare and communications missions.
- Enhanced operational focus – with credible operational concepts and operator-driven missions working across domains and warfare disciplines, and achieving in-stride integration with operational ships.
- More demanding serials – which got much closer to the way navies prefer to operate, including night operations and greatly extended ranges of over 50km separation.

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QinetiQ is always on your side, protecting, improving and advancing your vital interests

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