ATTACK CLASS SUBMARINE PROGRAM UPDATE

UNINHABITED UNDERWATER SYSTEMS THE FUTURE OF WARFARE

SWEDISH SUBMARINES UPGRADES AND NEW BUILDS

INTERVIEW: THALES AUSTRALIA CEO CHRIS JENKINS
New South Wales: A great place for defence

New South Wales is Australia’s economic, financial and education powerhouse. Home to more than a quarter of Australia’s Defence personnel, it also has vibrant cities and regional centres offering a lifestyle envied throughout the world.

The NSW advantage

- Largest state economy generating one third of the nation’s GDP
- Highest number of defence industry skilled workers
- Majority of the nation’s leading tertiary and research institutions
- 21 major Defence establishments and training areas.

Defence NSW

A dedicated team within the NSW Government working to create the conditions for sustainable, technologically advanced and globally competitive defence industries.

Find out why NSW is such a great place for defence.

Visit defence.nsw.gov.au and download the NSW Defence and Industry Strategy ‘Strong, Smart and Connected’.
New South Wales: A great place for defence

New South Wales is Australia’s economic, financial and education powerhouse. Home to more than a quarter of Australia’s Defence personnel, it also has vibrant cities and regional centres offering a lifestyle envied throughout the world.

The NSW advantage

- Largest state economy generating one third of the nation’s GDP
- Highest number of defence industry skilled workers
- Majority of the nation’s leading tertiary and research institutions
- 21 major Defence establishments and training areas.

Defence NSW

A dedicated team within the NSW Government working to create the conditions for sustainable, technologically advanced and globally competitive defence industries.

Find out why NSW is such a great place for defence.

Visit defence.nsw.gov.au and download the NSW Defence and Industry Strategy ‘Strong, Smart and Connected’.

defence.nsw.gov.au
FEATURES

12  SEA 1000 PROGRAM UPDATE
Is the Attack class costing $33.7 billion too much?

16  COLLINS LIFE OF TYPE EXTENSION
An increasingly vital project

20  THE NETHERLANDS WALRUS SUBMARINE REPLACEMENT PROGRAM
Four submarines similar to the Attack class for a fraction of the cost

23  UNINHABITED UNDERWATER SYSTEMS
Fewer manned submarines in the future?

26  UUVS – THE US PERSPECTIVE
The way of the future for many dangerous missions

30  CHIEF OF THE ROYAL SWEDISH NAVY, RADM EVA SKOOG HASLUM
Swedish expertise available for Collins LOTE

32  1ST PERSON FEATURE INTERVIEW
Thales Australia CEO, Chris Jenkins

36  THE RAN APPROACH TO MINE COUNTERMEASURES PT II
Are we taking the wrong approach?

40  CYCLONE HAROLD RELIEF EFFORT
RAAF and RNZAF working together.

REGULARS

04  EDITOR’S LETTER
COVID-19 and the consequences for Defence spending

NEWS

08  Boeing rolls out first Loyal Wingman aircraft

10  Geelong company to supply F-35 countermeasures flares

11  BAE Systems supports Loyal Wingman project

More Bushmasters for the Netherlands

Heaving lines are thrown from sailors on the casing of HMAS Farncomb as the boat comes alongside Diamantina Pier upon her return to Fleet Base West in Western Australia. During the deployment, Farncomb took part in the Fleet Certification Period 2020 which involved a number of major fleet units, RAAF assets, Clearance Dive Team One and various other Force Elements from mid-February to early March. Credit: CoA / James Whittle
ARTILLERY SOVEREIGN CAPABILITY

155MM ASSEGAI

155MM ASSEGAI MUNITIONS FAMILY
SUPERIOR PERFORMANCE  GREATER RANGE  INCREASED LETHALITY

Delivered and integrated by a 100% Australian Company.

NIOA
TRUSTED. PROVEN. AUSTRALIAN
EDITOR'S LETTER

KYM BERGMANN // CANBERRA

Under present circumstances it is hard to write about anything other than The Virus, even as Australia is showing early signs of a return to normality. The Federal and State governments – and the vast majority of people – are doing absolutely the right thing with an awareness that restrictions can only be carefully lifted and might need to be reimposed swiftly if circumstances deteriorate.

The only people against this measured approach seem to be the usual late night television carnival barkers, who are presumably seeking to parrot U.S. Republicans who want to open up the economy completely, no matter how great the loss of life. Fortunately, Australia is better than that. We have to face the reality that the best way to return to normal is to follow the rules and continue to do so for as long as the medical experts advise.

If anyone is wondering: yes, the APDR team has downloaded the COVIDSAFE app and we will continue to use it until the danger has passed. But while more than five million people have done the same, this is still a long way short of a really effective outbreak tracing system. That would take almost twice as many users. For this situation the Government has only itself to blame because previous failures in securing private information and IT fiascos such as Robodebt and the last census has eroded public confidence to such a degree that many people are wary of downloading something that is designed to secure their health and safety.

It is too early to calculate how the pandemic will affect Australian defence spending, but anyone who thinks that it will be business as usual is being prematurely optimistic. The local economy – and that of the rest of the world – might rebound extremely quickly. However, a much more likely scenario is for a slow and staggered recovery – particularly when the biggest economy of all in the form of the U.S. faces an uncertain future.

One obvious point is that tying Defence to 2% of GDP might now actually drag spending backwards. As we have pointed out previously, while the economy continued to grow – admittedly at a sluggish pace – that was good for the portfolio. Simply put, as the size of the national economic pie continued to grow that was the same for the Defence slice.

However, we are in uncertain times and almost all economists believe that we are entering a recession, with unemployment to spike at more than 10%. Now it is a matter of seeing how long the recession lasts and how deep it is. Given the commendably swift action of the Government with measures such as Job Keeper the effects will hopefully be at the milder end of the range. We also note the cooperation of State Governments, many businesses and the unions. Coming after the summer of misery due to the bushfires, these double disasters have been a test for the country – but so far, so good.

Defence can certainly manage a modest reduction in expenditure for a year, in line with a shrinking economy. However, if the recession lasts longer than expected and if the Government has to introduce measures to pay for the huge stimulus that has gone into the economy, it is hard to see how the portfolio could completely escape the consequences. This is despite a continuing deterioration in Australia’s overall strategic circumstances, with many analysts believing that China will become increasingly assertive in coming years and will be prepared to use force to further its national interests in the region.

Of the mega-projects that could be scaled back or re-scoped, the obvious choice is SEA 1000, which has already consumed an inordinate amount of money for little visible return. We have had misgivings about the sole source approach to the future submarine project for a long time and now those chickens are coming home to roost. By denying itself the usual mechanism of a healthy competition to minimise costs, if nothing is done then this project might drain the acquisition budget of Defence for years to come.

Plenty of people have suggested a Plan B, such as bringing Saab-Kockums back into the picture, most recently by the group Insight Economics, fronted by Professor Hugh White, who – not coincidentally - features in this issue of APDR. The report argued persuasively that the cost of funding the design of a New Generation Collins submarine would be tiny compared with the overall SEA 1000 budget – and it would put Naval Group under commercial pressure to control their own costs. The Government instantly dismissed this idea out of hand, with Defence Minister Linda Reynolds sticking with the tired old mantra that everything is on time, on budget and there is nothing to worry about.

In this edition, we go further than Insight Economics, pointing out that the Netherlands is in the process of acquiring four new submarines very similar to the Attack class for $5.9 billion. Compare this with the $50 billion that Australia plans to spend on 12 submarines that, furthermore, will be constructed at a far more leisurely pace. To put those basic numbers another way – Australia will spend ten times as much for only three times as many very similar submarines. This looks like madness – and it is.

To date, the Government has resisted any external review of SEA 1000 – even though alarm bells should have been ringing after the most recent ANAO report, which pointedly refused to endorse the schedule put forward by Defence, saying only that it was relying on the information supplied by the Department itself. COVID-19 will have as yet unforeseen consequences for Defence spending. If it contributes to a change of strategy for the future submarine program that will be a good thing.

Correction: In the previous edition of APDR we reported that the budget for the Future Frigate program is $39 billion; the number used by the Department of Defence is $36 billion. We also separately reported – wildly optimistically – that there will be 12 of these frigates when the actual number is nine. Both were reporter’s errors.
Engineered for success.

At Babcock, we believe in creating partnerships and solutions that are enduring. We work with you from contract to delivery and beyond, putting your priorities first. Our approach sets us apart in providing an efficient, high-quality service. We are a partner you can trust.
BOEING ROLLS OUT FIRST LOYAL WINGMAN UNMANNED AIRCRAFT
– SYDNEY, May 5, 2020 –

A Boeing-led Australian industry team has presented the first unmanned Loyal Wingman aircraft to the Royal Australian Air Force, a historic milestone for the company and the Commonwealth.

The aircraft, which uses artificial intelligence to extend the capabilities of manned and unmanned platforms, is the first to be designed, engineered and manufactured in Australia in more than 50 years. It is Boeing’s largest investment in an unmanned aircraft outside of the United States.

As the first of three prototypes for Australia’s Loyal Wingman Advanced Development Program, the aircraft also serves as the foundation for the Boeing Airpower Teaming System (ATS) being developed for the global defense market.

“This is a truly historic moment for our country and for Australian defence innovation,” said the Hon. Scott Morrison MP, Prime Minister of Australia. “The Loyal Wingman will be pivotal to exploring the critical capabilities our Air Force needs to protect our nation and its allies into the future.”

Air Marshal Mel Hupfeld, Chief of the Royal Australian Air Force, said the rollout of the first aircraft was a significant milestone in the Boeing Loyal Wingman project.

“This project is an excellent example of innovation through collaboration and what can be achieved working together with defence industry,” said Air Marshal Hupfeld. “This demonstrates the importance of the relationship Air Force has with Boeing Australia and defence industry more broadly. I look forward to exploring the capabilities this aircraft may bring to our existing fleet in the future.”

More than 35 members of Australian industry are supporting prototype work across four Australian states. With a global market demand for highly capable but extremely affordable unmanned aircraft, Boeing applied company-wide innovation to achieve those goals. The aircraft was engineered using a digital twin to model its structures, systems, capabilities and full life-cycle requirements; manufactured with Boeing’s largest-ever resin-infused single composite piece; and assembled using proven advanced manufacturing processes.

“We are proud to take this significant step forward with the Royal Australian Air Force and show the potential for smart unmanned teaming to serve as a force multiplier,” said Kristin Robertson, vice president and general manager of Autonomous Systems for Boeing Defense, Space & Security. “We look forward to getting the aircraft into flight testing and proving out the unmanned teaming concept. We see global allies with those same mission needs, which is why this program is so important to advancing the development of the Boeing Airpower Teaming System.”

The Loyal Wingman prototype now moves into ground testing, followed by taxi and first flight later this year.
BOEING ROLLS OUT FIRST LOYAL WINGMAN UNMANNED AIRCRAFT

– SYDNEY, May 5, 2020 –

A Boeing-led Australian industry team has presented the first unmanned Loyal Wingman aircraft to the Royal Australian Air Force, a historic milestone for the company and the Commonwealth.

The aircraft, which uses artificial intelligence to extend the capabilities of manned and unmanned platforms, is the first to be designed, engineered and manufactured in Australia in more than 50 years. It is Boeing's largest investment in an unmanned aircraft outside of the United States.

As the first of three prototypes for Australia's Loyal Wingman Advanced Development Program, the aircraft also serves as the foundation for the Boeing Airpower Teaming System (ATS) being developed for the global defense market.

"This is a truly historic moment for our country and for Australian defence innovation," said the Hon. Scott Morrison MP, Prime Minister of Australia.

"The Loyal Wingman will be pivotal to exploring the critical capabilities our Air Force needs to protect our nation and its allies into the future."

Air Marshal Mel Hupfeld, Chief of the Royal Australian Air Force, said the rollout of the first aircraft was a significant milestone in the Boeing Loyal Wingman project.

"This project is an excellent example of innovation through collaboration and what can be achieved working together with defence industry," said Air Marshal Hupfeld. "This demonstrates the importance of the relationship Air Force has with Boeing Australia and defence industry more broadly. I look forward to exploring the capabilities this aircraft may bring to our existing fleet in the future."

More than 35 members of Australian industry are supporting prototype work across four Australian states. With a global market demand for highly capable but extremely affordable unmanned aircraft, Boeing applied company-wide innovation to achieve those goals. The aircraft was engineered using a digital twin to model its structures, systems, capabilities and full life-cycle requirements; manufactured with Boeing's largest-ever resin-infused single composite piece; and assembled using proven advanced manufacturing processes.

"We are proud to take this significant step forward with the Royal Australian Air Force and show the potential for smart unmanned teaming to serve as a force multiplier," said Kristin Robertson, vice president and general manager of Autonomous Systems for Boeing Defense, Space & Security. "We look forward to getting the aircraft into flight testing and proving out the unmanned teaming concept. We see global allies with those same mission needs, which is why this program is so important to advancing the development of the Boeing Airpower Teaming System."

The Loyal Wingman prototype now moves into ground testing, followed by taxi and first flight later this year.

ASC is Australia's sovereign submarine sustainer, supporting Australia's strategic deterrent platform – the Collins Class submarine fleet – delivering beyond benchmark availability to the nation's defence.

A proven and trusted partner, ASC has forged partnerships with global submarine designers, makers and major equipment suppliers.

Our capability is delivered by our people; 1,300 leading submarine engineers, designers, project managers, skilled tradespeople and supply chain experts.

Together with Defence and industry, ASC is bringing naval capabilities into a new era.

ASC is Australia's sovereign submarine sustainer, supporting Australia's strategic deterrent platform – the Collins Class submarine fleet – delivering beyond benchmark availability to the nation's defence.

WE'RE AUSTRALIAN FOR SUBMARINES

ASC is Australia’s sovereign submarine sustainer, supporting Australia’s strategic deterrent platform – the Collins Class submarine fleet – delivering beyond benchmark availability to the nation’s defence.

A proven and trusted partner, ASC has forged partnerships with global submarine designers, makers and major equipment suppliers.

Our capability is delivered by our people; 1,300 leading submarine engineers, designers, project managers, skilled tradespeople and supply chain experts.

Together with Defence and industry, ASC is bringing naval capabilities into a new era.

ASC is Australia’s sovereign submarine sustainer, supporting Australia’s strategic deterrent platform – the Collins Class submarine fleet – delivering beyond benchmark availability to the nation’s defence.

WE'RE AUSTRALIAN FOR SUBMARINES

ASC is Australia’s sovereign submarine sustainer, supporting Australia’s strategic deterrent platform – the Collins Class submarine fleet – delivering beyond benchmark availability to the nation’s defence.

A proven and trusted partner, ASC has forged partnerships with global submarine designers, makers and major equipment suppliers.

Our capability is delivered by our people; 1,300 leading submarine engineers, designers, project managers, skilled tradespeople and supply chain experts.

Together with Defence and industry, ASC is bringing naval capabilities into a new era.

ASC is Australia’s sovereign submarine sustainer, supporting Australia’s strategic deterrent platform – the Collins Class submarine fleet – delivering beyond benchmark availability to the nation’s defence.

WE'RE AUSTRALIAN FOR SUBMARINES

ASC is Australia’s sovereign submarine sustainer, supporting Australia’s strategic deterrent platform – the Collins Class submarine fleet – delivering beyond benchmark availability to the nation’s defence.

A proven and trusted partner, ASC has forged partnerships with global submarine designers, makers and major equipment suppliers.

Our capability is delivered by our people; 1,300 leading submarine engineers, designers, project managers, skilled tradespeople and supply chain experts.

Together with Defence and industry, ASC is bringing naval capabilities into a new era.

ASC is Australia’s sovereign submarine sustainer, supporting Australia’s strategic deterrent platform – the Collins Class submarine fleet – delivering beyond benchmark availability to the nation’s defence.

WE'RE AUSTRALIAN FOR SUBMARINES

ASC is Australia’s sovereign submarine sustainer, supporting Australia’s strategic deterrent platform – the Collins Class submarine fleet – delivering beyond benchmark availability to the nation’s defence.

A proven and trusted partner, ASC has forged partnerships with global submarine designers, makers and major equipment suppliers.

Our capability is delivered by our people; 1,300 leading submarine engineers, designers, project managers, skilled tradespeople and supply chain experts.

Together with Defence and industry, ASC is bringing naval capabilities into a new era.

ASC is Australia’s sovereign submarine sustainer, supporting Australia’s strategic deterrent platform – the Collins Class submarine fleet – delivering beyond benchmark availability to the nation’s defence.

WE'RE AUSTRALIAN FOR SUBMARINES
GEELONG COMPANY CHOSEN AS SUPPLIER TO GLOBAL F-35 FLEET

– 4 May 2020 –

A Geelong-based company has been awarded a significant contract with the US Navy under the global F-35 Program cementing Australia’s reputation as a top defence exporter.

Chemring Australia, based in Lara, near Geelong, secured the USD$107.5 million contract for the production and delivery of countermeasure flares for Australian, US and international F-35 operators.

Chemring Australia is a leading manufacturer and supplier of air-launched countermeasures against sophisticated electronic systems.

Minister for Defence, Senator the Hon Linda Reynolds CSC, said the contract represents the culmination of a multi-year joint effort between the US Government, the Australian Government and Chemring Group to qualify Chemring Australia to produce countermeasures for the global F-35 fleet.

“This is a strong endorsement of our domestic manufacturing capability, and the policies we’ve put in place to bolster our sovereign defence capability,” Minister Reynolds said.

“This contract will also aid the ongoing advancement of a domestic munitions manufacturing capability – one of 10 Sovereign Industry Capability Priorities under our Defence Industrial Capability Plan.”

Minister for Defence Industry, the Hon Melissa Price MP, said Australian industry continues to perform outstandingly as part of the global
production and delivery of countermeasure flares for significant contract with the US Navy under the global Geelong Company Chosen as Geelong Company Chosen as

Chemring Australia, based in Lara, near Geelong, produce countermeasures for the global F-35 fleet. Chemring Group to qualify Chemring Australia to US Government, the Australian Government and culmination of a multi-year joint effort between the Reynolds CSC, said the contract represents the sophisticated electronic systems. "This is a strong endorsement of our domestic perform outstandingly as part of the global Industry Capability Priorities under our Defence minister for Defence Industry, the Hon Melissa "This contract will also aid the ongoing Advanced Development Program led by Boeing - Advanced Development Program led by Boeing

"We’ve leveraged the skills of the local supply chain to build a Loyal Wingman that will work together with other airpower teaming assets to provide an unmatched capability for Australia and for our global customers." - Chris Jenkins, CEO, Thales Australia
IS THE ATTACK CLASS COSTING $33.7 BILLION TOO MUCH?

Coming to grips with the fundamentals of SEA 1000 is proving as elusive as ever, despite Parliamentary oversight and some external scrutiny – most notably by the Australian National Audit Office. Defence Minister Linda Reynolds remains confident that the first of the new submarines will be operational 14 years from now, though the basis of that optimism appears to be assurances from the Department that everything will now go precisely to plan with no further delays or major difficulties.

Since Australia plans to build to an entirely new design – though one using many dated technologies – with a combat system contracted separately from a different supplier, in a new shipyard and with a new workforce, it is hard to see how such optimism is justified. In the absence of any serious competitive pressure on prime contractor Naval Group, there is no reason why SEA 1000 will not experience the major disruptions that a number of Defence acquisitions have gone through. These include the serially delayed and over budget Air Warfare Destroyers; the rebaselined Wedgetail AEW&C program; the cancelled Super Seaprite helicopters; the rust buckets HMAS Manoora and Kanimbla – and so on and so forth. It is a very long list – and one that should cause the Minister to be very sceptical of Departmental advice, particularly concerning maritime projects, but this appears not to be the case.

A major ongoing area of uncertainty and controversy is the program cost of SEA 1000. This should be relatively easy to figure out but it is not because the Department uses the concept of “out turned dollars” – which is an estimate of how much is going to be spent each year cumulatively far into the future.

Trying to make sense of this is illustrated by the following exchange during Senate Estimates involving Defence Minister Linda Reynolds, Labor’s Penny Wong, and program manager RADM (now Mr) Greg Sammut:

Senator Reynolds: Senator Wong, just on that point, there have been some wildly inaccurate figures in the public. For the project, as the
former finance minister, Senator Wong, you would understand that it’s easier to keep it in that constant dollar for that constant reference, which is that $50 billion. Despite some of the media, that is still the figure and that is still the cost. There hasn’t been a blowout from that figure.

Senator WONG: I wasn’t even trying to make a point about blowouts. I’m on a completely different point, but I’m happy to get to—

Senator Reynolds: Because you were talking about changing the figures, so if we can stick with the baseline figures that would be very helpful so that we are comparing apples and apples.

Senator WONG: No, I was making a different point, actually. I was making a point about dollars—project cost or project values at 2016 and 2017 is not the same in dollars in 2019, 2020 and 2021. So I was actually just asking that before I then moved to the next question, which resulted from your previous answer. Are we still at $50 billion or, given that’s $50 billion in 2016-2017 dollars, are we at 60 or 70?

Mr Sammut: What is the cost in today’s dollars?

Senator WONG: Correct.

Mr Sammut: I’ll have to come back to you so that I can work out what that is.

In other words, the program director was unable to tell the Senate what the cost is in today’s dollars.

Another way of looking at this is to check comparable programs. In a separate article in this edition of APDR, we look at the Netherlands. That country is replacing four Walrus class submarines with four new ones before the end of this decade. This is a good example, because the Walrus is a very capable – if ageing – long range submarine very similar to Collins. In fact, in the 1980s the Walrus was a strong contender for the Australian contract and was close to making the shortlist, missing out because it was considered to be too complex with a double hull design – and therefore too risky and expensive.

There are strong similarities between the Australian and Netherlands requirements. Indeed, Naval Group are bidding something similar to the submarine being developed for Australia. Perhaps even more pertinently, Saab Kockums – excluded from the SEA 1000 competition – are offering something that could be considered a Next Generation Collins.

The Dutch budget for four submarines is €3.5 billion. The Australian budget in 2016 dollars is €32 billion. For three times as many submarines Australia is paying ten times the price. That makes no sense at all. Mathematics tells us that 12 submarines similar to the Attack class built in the Netherlands would cost around €10 billion. Even given that Australia has lumped in everything – weapons, facilities, etc it comes nowhere near explaining a discrepancy of €20 billion – which in 2020 dollars is a staggering $33.7 billion.

If Naval Group win the Netherlands competition, they will be in the extraordinary position of delivering Attack class submarines to that country for a fraction of the cost that Australia will be paying. If Saab-Kockums win it will be a reminder of what Australia could have had if they were not outrageously discarded in 2014. On top of everything else, the Netherlands wants to have the first of their new submarines in service later this decade – a full five years ahead of SEA 1000.

How are the Dutch managing to achieve what looks like a far better outcome, spending much less money and receiving their submarines sooner? By running a competition.

The Department of Defence is not proving to be particularly helpful regarding SEA 1000 and in response to a number of detailed questions said to APDR:

“Naval Group is continuing to progress definition design of the submarine platform system, in parallel with preliminary design of the combat system. This work is led by Lockheed Martin Australia and includes subsystem design. As supplier selection continues (for example, the competitive selection process for the combat system), progression of the platform system is being planned. This will ensure the definition is in line with the Defence Department’s requirements.”

Naval Group CEO Paul Panter said this week that the platform systems design work is “very important”.

Mr Sammut: It is important to explain a discrepancy of $80 billion in out turned dollars.

Senator WONG: What is the cost in today’s dollars?

Mr Sammut: That is a difficult question to answer.

Senator WONG: I wasn’t even trying to make a point about blowouts. I’m on a completely different point, but I’m happy to get to—

Mr Sammut: I’ll have to come back to you so that I can work out what that is.

There are a couple of issues around local content targets, probably the most important being a decision on when the assessment is made. If the 60% – which is calculated on dollars spent in Australia – is measured at the very end of the program when the last Attack class retires around the year 2090 or 2100, then that figure will be relatively easy to reach because one assumes that all of the support work will be done in Australia. However, if the intent is to have 60% Australian content on the first of class and all subsequent submarines that target is far more difficult to achieve and usually takes time and money. It

The Australian budget in 2016 dollars is Euro 32 billion. For three times as many submarines Australia is paying ten times the cost.

How are the Dutch managing to achieve what looks like a far better outcome, spending much less money and receiving their submarines sooner? By running a competition.
There are a couple of issues around local content targets, probably the most important being a decision on when the assessment is made.

BRING BACK COMPETITION - PROFESSOR HUGH WHITE

One of Australia’s foremost strategic thinkers believes that the only way to ensure a successful outcome for SEA 1000 is to bring a competitor back into the equation. A former senior Defence official and National Security Advisor to Prime Ministers Hawke, Keating and Howard, he believes that Saab-Kockums should be funded to produce an alternate design to that currently being undertaken by Naval Group.

He pointed out that the present sole source arrangement gives the Australian Government very little leverage – and that the absence of a Plan B means that there could be a gap in vital submarine capability should Naval Group be unable to deliver on schedule. We discussed why Australia has put itself in a position of potentially catastrophic vulnerability:

“Part of that was the very naïve belief about this project that it was part of a broader strategic relationship with France, which we would be able to leverage. I have had people around Canberra telling me that they French will always do the right thing by us because they are so motivated to support us in the western Pacific for broader strategic reasons. This has always seemed to me to be a fantasy.

“France has had no serious strategic interests in the western Pacific since roughly 1914 – more than one hundred years ago. The French Government has its own issues with Naval Group that will take priority. The notion that they will help out Australia because they want a friend in Asia is fanciful.

“We have to regard this as a commercial relationship – that is the only way to make sure this works for us. The French Government will act according to the best interests of the French taxpayer – that’s what they are being paid to do. And our people are not doing their best for the Australian taxpayer by acting in the way that they are on this program under the illusion that France will do us favours. With the best will in the world, Australia is not going to be the number one priority for Naval Group in the decades to come.”

sovereign industrial priorities. It also includes appropriate ownership and rights with respect to intellectual property and prudent control over technical data and information. These range from capabilities such as continuous shipbuilding and land combat vehicles through to signal processing among our sort of core priorities for sovereign industrial capabilities.”

Asked for an update of what they have been doing during the last six months, Naval Group Australia supplied the following list:

• The company signed the largest contract to date for the procurement of equipment for the Future Submarine Construction Yard. Australian suppliers Berendsen Fluid Power and H.H Machine Tools Australia (H&H) have partnered with international companies Pinette and Starragg to deliver and sustain the Medium Capacity Press, High Capacity Press and Large Capacity Milling Machines for the Attack Class submarines. The contracts will see Australian industry share in around $20m worth of work.
• Australian supplier PMB Defence and Greek supplier Sunlight were contracted to provide design, prototyping and qualification activities for the Main Storage Batteries. Both organisations will provide Naval Group with the data necessary to select one as the preferred MSB design for the Attack Class program in 2022.
• Naval Group launched the Building Australian Industry Capability survey seeking input from local suppliers to further highlight and profile the capabilities and products they can offer to the Attack Class Submarine Program. This survey is still open and I strongly encourage you to have your say.
• The first three submarine apprentices for the Future Submarine Program commenced with Naval Group Australia, following a competitive recruitment process which saw over 400 candidates apply. The apprentices have commenced a four-year fabrication apprenticeship program with ASC working on the Collins Class submarine program. Upon completion of their apprenticeships towards the end of 2023, they will transfer back to Naval Group Australia and form part of the hull qualification section’s core team.
• The Hon. Linda Reynolds, Australian Minister for Defence and Vice Admiral Michael Noonan, Chief of the Royal Australian Navy visited NGA HQ in Adelaide to celebrate the commencement of Naval Group Australia’s 200th employee.
• We, and the larger Naval Shipbuilding Enterprise, hope to be able to provide an employment lifeline for skilled workers displaced by COVID-19 either long term, or until they’re able to go back to the jobs they had.

Looking at the remainder of 2020, Naval Group Australia outlined work in the following domains:

• We continue to work with ANI in regards to the design of the Submarine Construction Yard (SCY).
• The Submarine Construction Yard will be located on approximately 40 hectares of land, with the main outfitting hall being the same length as the Adelaide Oval complex.
• The scale of the equipment at the site will be unique within Australia. It will contain all the necessary buildings and equipment to support the construction of three submarines at various stages of completion.
• The construction halls, blast and paint workshop, warehousing and other facilities for the Future Submarine Construction Yard in Osborne will come to life this year. You will see visual progress.
• We continue to engage with Australian industry in regards to the opportunities available to them – over 1,000 lines items need to be procured for the SCY from large manufacturing items to tools.
• We will continue to grow with a strong focus on increasing the size of our Engineering and ICT teams to ensure we continue to build our local capability in regards to our knowledge, systems and tools.
• Once it is safe to do so, our next cohort of submarine Design Authority Engineers will relocate to the French port of Cherbourg to undertake specific submarine design training to develop an intimate understanding of the know-how and know-why of Australia’s Future Submarines – 12 regionally superior Attack-class submarines.

This does not cover the work taking place in France, for which Naval Group have now received around $500 million.
Building a Stronger Australian Defence Industry

Now and into the future.

The Australian Future Submarine Program is the catalyst for unprecedented industry collaboration and development.

Naval Group and our partners are working with Australian industry to meet the requirements for this truly strategic and complex national endeavour. We are committed to maximising opportunities at every phase of The Program, across all states, territories and business sizes.

If you are interested in working on the Future Submarine Program, register your interest on the Industry Capability Network gateway at www.NavalGroupFutureSubmarine.icn.org.au
As things stand, the first LOTE is scheduled to begin in 2026 – and given that each boat will be out of the water for two years for a simultaneous Full Cycle Docking, the last one will go back into service in 2040. Given the changing strategic circumstances based on increasing Chinese military strength and the relative decline of U.S. naval power, questions are being asked about whether this is too little, too late.

The Government has still not confirmed that all six submarines will be upgraded, which seems strange under the circumstances. Another factor coming into play is where the work will take place – Adelaide or Fremantle. This has seen both public and private brawling between the State Governments – and a compromise might see a hybrid model with the LOTE split between locations. How this might function in practice is unclear.

We sought answers from Defence on a number of related topics, starting with upgrades to Collins that are underway, which include SEA 1439 Phase 5B2 – Collins Communications and Electronic Warfare Improvement Program and SEA 1439 Phase 6 – Collins Sonar Capability Assurance Program.

Defence says that SEA 1439 Phase 5B2 is delivering a modernised submarine communications system and updated electronic warfare system to

Keeping the fleet of six Collins class submarines at the leading edge of capability is a very high priority given their importance for the defence of Australia. While they have been steadily upgraded, the key to keeping them going is the Life Of Type Extension, which will extend the life of the fleet until the 2050s. This is a strategic necessity given the sedate pace of new Attack class deliveries, even assuming that they take place on schedule.
the Collins fleet, including a submarine internet protocol capability.

SEA 1439 Phase 6 is delivering an upgraded sonar suite including new bow and flank arrays and associated processing. These upgrades are taking place alongside updates to a number of systems on board the Collins class, including an update of the integrated ship control management and monitoring system. All upgrades and updates are undertaken during planned maintenance periods in accordance with the Collins usage and upkeep cycle.

Turning to the future, Defence says that the proposed Collins LOTE Project includes changes to planned maintenance routines, the procurement of additional spares, and a number of updates/ upgrades of platform systems to manage obsolescence, supportability and capability needs identified in scoping studies conducted by Capability Acquisition and Sustainment Group and industry in 2016 and 2017.

The LOTE project is being developed and implemented across three work packages, Core, Part A and Part B, to be undertaken in a phased approach to address needs in priority order. The Core work package will be implemented in the two-year LOTE Full Cycle Dockings (FCD) commencing with HMAS Farncomb in June 2026. This allows sufficient time to ensure engineering changes are developed to the necessary level of maturity before implementation in the first Collins submarine.

Being smaller in scope, Work Packages A and B will be implemented in shorter docking periods. There is a standard allocation of industry labour hours for upgrade and update engineering changes in each 2-year FCD period. This standard allocation is currently used for the implementation of Collins upgrade projects (for example, SEA 1439 Phase 6). This allocation of labour hours, coupled with time allocated to the maintenance of systems to be replaced under LOTE, will be used to complete implementation of the Core work package within the standard 2-year FCD period.

The main upgrades intended for the Core work package are the main motor and its control system, diesel generators, and static converters. Beyond addressing supportability of these existing systems, this work is expected to generate improvements in the stealth of the Collins class and other performance-related advantages.

Concept design studies and supporting business cases for the Core work-package are nearing completion. These will be used to support Government consideration of the Core work package in Financial Year 2020/2021. Further engineering and procurement of long lead time items will commence following Government approval, as well as the work on the concept designs and supporting business cases for Work package A.

Asked about the technology connection with the SEA 1000 contract, Defence says that as far as practicable, the Collins Submarine Program will select the same equipment and suppliers used by the Attack Class, to maximise synergies and minimise costs for design, manufacture, test and trials, operation, and in-service integrated logistic support. This will also benefit crew training in the transition years from Collins class to the Attack class. A clear example of this is the intention to use diesel generators selected for the Attack class as replacements for the existing diesel generators in the Collins class under the LOTE project.

The notion of bringing forward the LOTE appeals to many people, including Ron Finlay, Chairman of the Government’s Naval Shipbuilding Advisory Board, who has recommended this as a way of putting Naval Group under some pressure for SEA 1000. The logic is that if a major upgrade to Collins can be successfully brought forward the Government and the RAN will no longer be hostage to the sole source future submarine program and might buy enough time to consider alternate suppliers should the French be unable to deliver on the promised schedule.

This approach also appeals to Professor Hugh White, an outspoken critic of the current approach not only to SEA 1000 but also to the general question of Australia’s overall submarine capability. He also believes that the Collins LOTE should be brought forward, explaining:

“One of the challenges is to work out how many submarines we need – and how fast. In the 2009 White Paper when the Rudd Government committed to replacing six Collins with 12 future submarines – and that was hailed as a vast improvement in Australia’s maritime capability. But no one seemed to notice that on the schedule that was subsequently foreshadowed, the 12th boat would not come into service until the middle of the century. Given the associated retirement from service of the Collins class, Australia would not get beyond six submarines until the late 2030s, at the earliest. It always seemed to me that was way too slow – the reality is that Australia needs more submarines quickly and the LOTE is critical for that.”

“The problem seems to be that if Defence accelerates the LOTE that means they are expressing a lack of confidence in SEA 1000. And they are right: they should have a lack of confidence because the level of program risk is extremely high. Even if SEA 1000 were to run like a Swiss watch it is still a good idea to proceed with the LOTE as fast as possible, both to reduce overall risk – and to have a chance of more submarines in service for a longer period of time during the next few decades.”

The reality seems to be that neither the Government nor the RAN has any sense of urgency about a submarine gap. This occurred previously when the Oberon submarines started to retire in the early 1990s – but the new Collins would not be operational until later in the decade. Australia’s strategic circumstances are becoming more dangerous and unpredictable than they were 30 years ago – yet decision makers seem oblivious to lessons from the past.
SURVIVING ISOLATION DUE TO COVID-19 – A SUBMARINER’S PERSPECTIVE

Living in isolation and social distancing has fast become the new normal, but these new living conditions don’t come naturally to most people. However, for months at a time, submariners live under the ocean surface. With only their crew as company and a space equivalent to 90sqm, they know better than anyone how to tough out isolation and how to transition back to their life before.

For 28 years, Stephan Meunier, a French Navy submariner became accustomed to living in isolation. Stephan now works for Naval Group, who have been tasked with designing and building Australia’s next generation of submarines.

How long were you a submariner, and what was your rank and responsibility?
I was a submariner in the French Navy for 28 years, retiring as a Commanding Officer of the French SSN squadron in Toulon.

What is your role at Naval Group?
After leaving the Navy three years ago, I took a position at Naval Group as the Head of Operational Marketing. Part of that role is to help the naval architects ensure their submarine designs are fit for purpose.

What is living on a submarine like, and how long did you spend at any one time onboard?
Different patrols lasted for different lengths of time, generally anywhere between 50 – 80 days. Generally, there was little to no connectivity with the outside world depending on the purpose of the patrol. Only certain people get to look out of the periscope, so being able to see outside was limited.

With a crew of around 70 people living in 90 square meters, you have to be mentally prepared for each patrol by understanding the objectives, your role, as well as bringing a positive attitude to the day, otherwise people would suffer from the isolation.

How did you organise your day, and make sure you stayed on task and worked efficiently?
The most important thing to note is that we had good working stations set up, no matter your role. We always planned our day around our meals to ensure we kept on a strict time line, we ate well, slept well and maintained our grooming habits.

These are the fundamental tasks you have control over, so it was important that you keep order and consistency, otherwise you become less efficient and disorganised.

How did you handle stress and anxiety in a small space?
There wasn’t a lot of stress on board as everyone knew their role; we shared the burden of our patrols and leaned on each other for support. What’s important to remember when working in isolation is connecting with the people you are surrounded by, through phone calls or video chats. That human contact is important.

It’s most common to experience feelings of isolation by the 40 day mark, it’s a well-known phenomenon amongst submariners that is the most difficult period, so we forward plan to ensure we have something organised, a special meal or a games night for example to help build morale.

What is your advice to people currently living in isolation?
The most important thing you can do is organise your days, you must find the balance between working and living, which includes looking after yourself through exercise, sleeping, having a quality diet and grooming.

You should also, where possible try to have a positive outlook. This period of isolation will end, and you’ll be able to return to normal life eventually. Keep an eye out for your team members and friends, those who are withdrawing further will need your support the most!

Find special events, meals, books or days to look forward to. Giving yourself something out of the ordinary to look forward to gives you a break from your constant ‘at home life’. Most importantly though, when you look out your window, think of all those submariners who can’t!!

What are your tips to returning to “normal” life after isolation?
Get out of your cocoon. Your routine, what you wear, what you eat, everything, will change when you go back to your daily life so it’s critical to make sure you begin to readjust yourself prior. For example, set your alarm at the same time it’d go off for work each day and complete your morning and evening routine. Also, make sure your work wardrobe is ready, have everything ironed and clean so you aren’t in a scramble when you have to start commuting again. This point is about making sure you don’t show up to work in your sweat pants with greasy hair just because that’s what you’re used to.

Make the effort to re-connect. During isolation you may have been in contact with your work colleagues more than ever, however don’t forget about all of the other people in your life you’ve not seen or had zoom dinner parties with. They will appreciate it as much as you would!

And finally, take it easy! There is a good chance you didn’t do much driving during isolation – take it slow – chances are you’ve forgotten a few things.
South Australia is home to the nation’s largest and most complex naval shipbuilding projects including construction of the Arafura class offshore patrol vessels, Australia’s new Hunter class frigate fleet and the Attack class submarine program.

With a highly-skilled workforce, globally competitive maritime industry and a world-class maritime precinct, it is not difficult to see why the future of naval shipbuilding is centred in South Australia.

Our attractive business environment, enviable lifestyle and significant investment in the state’s innovative precincts and facilities attracts the biggest projects and brightest minds, creating unprecedented opportunities within defence industry.

So when you think defence, think South Australia – The Defence State.
“With its major seaports and maritime interests in Europe, the Caribbean and other parts of the world, it is important for the Netherlands to have an underwater military capability at its disposal,” states a letter sent by the Dutch Ministry of Defence (DoD) to the Parliament in June 2015 concerning the replacement of the ‘Walrus’ class submarines. It continues: “With its intended replacement of the Dutch submarine capability, the Netherlands would be making a considerable contribution to the fulfilment of NATO’s prioritised requirements in the areas of anti-submarine warfare, picture compilation and intelligence-gathering.

The strategic importance of NATO and the European Union (EU) is clearly reflected in the requirements outlined in the letter from the DoD to the Parliament. Indeed, those considerations are also tightly linked to cost constraints. In its letter, the DoD notes that key to the strategic partnerships that will be formed for this program will be the efficiency in terms of the total cost of ownership; the Netherlands is seeking for “far reaching cooperation throughout the total lifecycle.” As such, back when the letter was written in 2015, the Dutch DoD was looking closely at submarine replacement programs in Australia, Canada, Germany, Norway and Sweden, seeking similarities in the requirements and operational concepts, and assessing areas of complementarity. Clearly, in examining the development of submarine programs in partner nations, the Netherlands was hoping to identify potential industrial partners for its own ‘Walrus’ replacement.

The importance of cooperation is equally emphasised in the capability requirements. “To derive maximum benefit from cooperation, the Dutch submarine must wherever possible have the same properties, systems and user philosophy as those of partner nations,” notes the DoD letter. In terms of requirements, this translates into ‘versatility and adaptability’.

The various missions undertaken by the RNLN – whether to protect the interests of the Kingdom around the mainland and its overseas territories in the Caribbean or as a key contributor to European and NATO missions – mean that any submarine

The country sees itself as a key strategic partner within NATO, contributing regularly to alliance missions and stand-by forces, including the Very High Readiness Joint Task Force, Standing Naval Forces and enhanced Forward Presence. However, the NATO ‘Defence Planning Capability Review 2017/2018’ found that while the RNLN could provide nearly all of the maritime forces requested by the NATO Capability Targets in quantitative terms until 2022, in qualitative terms some of these targets might not be met. In particular, “the replacement of the M-class frigates, the mine countermeasures vessels, and the ‘Walrus’ class submarines, all of which are planned for the medium term after 2024, is a pressing issue as current capabilities are becoming obsolescent.”

Furthermore, the letter from the DoD highlights that, according to the NATO priority shortfall areas Joint Intelligence, Surveillance and Reconnaissance (JISR) and Anti-Submarine Warfare (ASW), few European countries have conventional submarines able to be deployed in an expeditionary manner for reconnaissance and intelligence collection, while ASW appears to be an area in need of improvement within NATO at large. As such, the letter continues, “The Netherlands can prove itself to be a constructive and reliable ally by investing in priority capability areas and by replacing capabilities that are not available or are in short supply in other European countries.”

NATO requirements are only one part of the strategic context surrounding the ‘Walrus’ replacement program, however. The importance of building-up European defence industry by way of cooperation is the other key element. In a (untitled) document produced by the Dutch Underwater Knowledge Centre (DUKC), particular emphasis is placed on the importance of Dutch industries designing and building the replacement submarine. According to that document, “The Netherlands has a mature infrastructure of integrators and suppliers of systems, sub-systems and components for the national and international maritime market, as represented by the DUKC;” but European collaboration is key for “solving challenges concerning the production of the all-important pressure hull.” Under a European collaborative program, facilities, scarce capacities and knowledge can be shared to reduce risks.

THE ‘WALRUS’ PROGRAM IN CONTEXT

One might argue that any submarine replacement program carries significant political implications. After all, submarines’ ability to gather intelligence, protect and deter make them one of the key strategic assets of any country with naval ambitions. But Dutch naval ambitions are not purely national.

The country sees itself as a key strategic partner within NATO, contributing regularly to alliance missions and stand-by forces, including the Very High Readiness Joint Task Force, Standing Naval Forces and enhanced Forward Presence. However, the NATO ‘Defence Planning Capability Review 2017/2018’ found that while the RNLN could provide nearly all of the maritime forces requested by the NATO Capability Targets in quantitative terms until 2022, in qualitative terms some of these targets might not be met. In particular, “the replacement of the M-class frigates, the mine countermeasures vessels, and the ‘Walrus’ class submarines, all of which are planned for the medium term after 2024, is a pressing issue as current capabilities are becoming obsolescent.”

Furthermore, the letter from the DoD highlights that, according to the NATO priority shortfall areas Joint Intelligence, Surveillance and Reconnaissance (JISR) and Anti-Submarine Warfare (ASW), few European countries have conventional submarines able to be deployed in an expeditionary manner for reconnaissance and intelligence collection, while ASW appears to be an area in need of improvement within NATO at large. As such, the letter continues, “The Netherlands can prove itself to be a constructive and reliable ally by investing in priority capability areas and by replacing capabilities that are not available or are in short supply in other European countries.”

NATO requirements are only one part of the strategic context surrounding the ‘Walrus’ replacement program, however. The importance of building-up European defence industry by way of cooperation is the other key element. In a (untitled) document produced by the Dutch Underwater Knowledge Centre (DUKC), particular emphasis is placed on the importance of Dutch industries designing and building the replacement submarine. According to that document, “The Netherlands has a mature infrastructure of integrators and suppliers of systems, sub-systems and components for the national and international maritime market, as represented by the DUKC;” but European collaboration is key for “solving challenges concerning the production of the all-important pressure hull.” Under a European collaborative program, facilities, scarce capacities and knowledge can be shared to reduce risks.

THE ‘WALRUS’ REPLACEMENT REQUIREMENTS

The strategic importance of NATO and the European Union (EU) is clearly reflected in the requirements outlined in the letter from the DoD to the Parliament. Indeed, those considerations are also tightly linked to cost constraints. In its letter, the DoD notes that key to the strategic partnerships that will be formed for this program will be the efficiency in terms of the total cost of ownership; the Netherlands is seeking for “far reaching cooperation throughout the total lifecycle.” As such, back when the letter was written in 2015, the Dutch DoD was looking closely at submarine replacement programs in Australia, Canada, Germany, Norway and Sweden, seeking similarities in the requirements and operational concepts, and assessing areas of complementarity. Clearly, in examining the development of submarine programs in partner nations, the Netherlands was hoping to identify potential industrial partners for its own ‘Walrus’ replacement.

The importance of cooperation is equally emphasised in the capability requirements. “To derive maximum benefit from cooperation, the Dutch submarine must wherever possible have the same properties, systems and user philosophy as those of partner nations,” notes the DoD letter. In terms of requirements, this translates into ‘versatility and adaptability’.

The various missions undertaken by the RNLN – whether to protect the interests of the Kingdom around the mainland and its overseas territories in the Caribbean or as a key contributor to European and NATO missions – mean that any submarine
capability should be highly versatile. It needs to be able to operate in shallow waters as well as in deep waters. Technically, this means that for shallow waters a submarine needs to have excellent above water sensors but also a design that can facilitate ship control, "which, in those shallow waters, should be approaching perfection," Richard F.M. Keulen, EMSD, Director Naval Sales Support Damen told APDR. When operating in deep waters, the pressure hull is of the utmost importance but so is the ability to operate at high speeds, the Air Independent Propulsion (AIP) system and the sensors, Keulen continued. Any submarine designed for the RNLN needs to take all of these constraints into account.

Versatility also means designing a submarine that can fulfil the multiple roles played by the RNLN, intelligence gathering and the projection of special forces being an essential part of it – especially if the Netherlands wish to fill this capability gap within NATO. The submarine design therefore needs to focus on the ability to accommodate and deploy Special Forces, as well as the capability to launch unmanned underwater vehicles (UUV).

Finally, the strategic deterrence role submarines play within any given navy remains a high priority for the Netherlands, and the letter from the DoD clearly states that the 'Walrus' replacement should combine hard-and soft-kill options: the former with heavyweight torpedoes and possibly missiles; the latter with capabilities that can disable enemy ships rather than destroying them.

As for "adaptability", this clearly meant future-proofing the design of the submarine. From space and flexibility in the design to accommodate adjustments in staffing and functionality, to maintenance programs and future new sensors, the RNLN seeks to acquire a modular submarine that can bend to changing requirements as geopolitics, strategy and technologies evolve through time.

**REPLACEMENT BIDS**

The June 2015 letter from the DoD to the Parliament officially launched the ‘Walrus’ replacement program, although the Defence Materiel Process (DMP) did not start until 2016. The DMP is made up of four phases (A to D) through which the government progressively refines the requirements for the capability to be procured.

The A-phase kicked-in in 2016 with the publication of the A-letter, where the requirements originally outlined in the June letter were to be reflected more clearly. Four companies presented a bid on the basis of that document: Navantia, with a modified S80 Plus design, TKMS with a HDW 212CD class design, Damen-Saab with the Extended Range version of the A26, and Naval Group with its Shortfin Barracuda oceanic diesel-electric design.

The B-phase, where an initial selection of designs is made and some additional requirements identified, was supposed to be published in mid-2018, but delays in the decision-making process postponed the publication of the B-letter to December 2018. At that point, only Navantia had been eliminated from the bidding process.

The C-phase is now ongoing, with an aim to sign the contract with the winning industrial partner(s) in 2022.

**TKMS**

With the HDW class 212CD, the German shipyard has chosen to offer a solution that will also be used by the German and the Norwegian navies, although the variant proposed to the RNLN will of course be adapted to fit the Dutch requirements.

At 2,400t, the key feature of the German design, according to TKMS, is its stealth, which relies on three components: the diamond shape design, which the company claims significantly reduces Target Echo Strength; the proven fuel cell-based AIP, which ensures several weeks of submerged range with no additional signature; and, a non-magnetic design that the company claims makes the submarine invisible to upcoming Magnetic Anomaly Detection (MAD) sensors. The design also features firepower and should be optimised for Special Operations Forces (SOF), though details on the latter are scarce in publicly available information.

Strategically speaking, the initial letter from the DoD noted that "involvement with the German industry could be interesting, partly with a view to broadening maritime cooperation with Germany." Seeking to play to this potential strategic advantage, TKMS has announced that it would build the submarines in Den Helder in the Netherlands, which would create a so-called 'Submarine Valley' when linked with Kiel, where TKMS is based. Its Dutch partners include Marin and the Netherlands Organisation for Applied Scientific Research (TNO), both of which have extensive knowledge in underwater technologies.

While this could play to TKMS’ advantage, there are however two elements that could ultimately lead to TKMS losing this bid. The first one is the fact that Germany has an operational concept that is different from that of the Netherlands, although the two countries do already have submarine cooperation established at different levels. But perhaps even more discriminating is the fact that currently none of the two 212CD variants that have been offered - for Germany and Norway - include in their design the possibility to deploy Special Forces (SF). There is no doubt the company is capable of adapting its design, however seeing the importance the Netherlands

**NAVAL GROUP**

The French shipbuilder is offering the 4,500t Shortfin Barracuda oceanic diesel-electric design, the same design that won the Australian SEA 1000 competition back in 2016. Prompted for more details, the company has remained rather elusive as to the characteristics that would be specific to the Dutch requirement, however a company spokesperson noted in a written statement to APDR: "The ‘Barracuda’ class family offers the right balance of acoustic discretion, extended endurance and mission versatility from
intelligence gathering to SOF on a platform ready for future upgrades and overhauls.”

Technically speaking, it is clear that the Shortfin Barracuda would be a good fit for the purposes of the Dutch navy. The initial design of the Barracuda family was developed in close cooperation with the French Navy, and although the concept of operations between the Marine Nationale and the RNLN may not be entirely similar, the two operate in areas that require their submarines to have long endurance and can deploy SF; the original design of the SSN Barracuda does, indeed, include such capabilities. Moreover, the same design was sold to Australia, which the DoD letter noted has a similar concept of operations to that of the Netherlands. In fact, the Australian design features an AIP system rather than nuclear propulsion, which indicates that Naval Group could deliver the same to the Netherlands – as opposed to the French nuclear-propulsion version.

Though the French shipbuilder’s technical and strategic advantages are obvious in this case, a few issues may still thwart its ambitions for the ‘Walrus’ replacement. Firstly, as noted in the DoD letter, Australia had a submarine requirement that was for a much larger, more expensive submarine. Indeed the whole Australian program of twelve submarines was originally priced at AU $50 billion ($32.1bn) where the Netherlands has earmarked 3.5 billion ($3.8bn) for four submarines. Similarly, Naval Group is offering a 4,500t design when the RNLN is seeking a design that would be closer to the 2,350t surface displacement (2,650 submerged) of the ‘Walrus’ class it is intended to replace.

Another, though potentially minor, issue may be the fact that, while Naval Group has chosen like everyone else to partner with a Dutch industry player for its bid (Royal IHC), the latter does not have experience in building submarines – their expertise lies in design and manufacturing of dredging vessels. Nevertheless, the Naval Group spokesperson noted that the company “benefits from ongoing programs with the Dutch DoD, such as the Mine Countermeasures Vessels, and have been independently engaged with the Netherlands industrial eco-system for many years.”

**DAMEN-SAAB**

As for the joint offer Daman-Saab, it is based on the A26 Extended Range version of the design currently being built by Saab Kockums for Sweden. Wiebe B.H.J. Schmitz, Director Marketing Saab Kockums, told APDR that the submarine offered to the RNLN would be 80m long, 8m in diameter with a surface displacement of 3000t and unmatched shock resistance. “It is slightly bigger than the present ‘Walrus’ class because of the insertion of the AIP system,” added Schmitz.

Much like Naval Group’s Shortfin Barracuda design, the A26 Extended Range fits very well the requirements outlined by the Dutch DoD. It features a multi-mission portal – already integrated in the design for the Swedish Navy – that can launch SF, diver teams and mini submarines. The design is modular as well, but Schmitz was able to point to a particular strength of the Daman-Saab offer: “We can adapt the submarine during its lifecycle, much like what was done with the Swedish Navy ‘Gotland’ class where two additional modules were added by cutting the submarine open where the modules where to be inserted.” As for the AIP solution, the Stirling solution from Saab has been operating for 20 years and has been improved regularly, presenting the RNLN with a low-risk option.

Strategically speaking, while the Swedish concept of operations differs from the Dutch one, according to the June letter, the partnership with Damen is meant to address this. “We have the knowledge, program management expertise and knowledge as well as intimacy of the Dutch customer required for carrying out such program successfully,” Keulen told APDR, and though Damen has no recent industrial experience building submarines, the partnership with Saab Kockums means this is not a concern. The partnership between the two companies takes the form of an exclusive industrial consortium, securing the cooperation of leading Dutch companies.

**STAYING THE COURSE**

Speculating on the outcome of a naval procurement program is quite difficult at the best of times. The current Covid-19 sanitary crisis, which will most likely result in a significant worldwide recession, adds a further level of uncertainty. And there is no telling what this crisis will do for defence budgets in the years to come.

Given the strategic importance of the submarine capability, it is unlikely that the Dutch ‘Walrus’ replacement program will be another victim of the coronavirus. An ‘Alert’ piece published by the Netherlands Institute for International Relations (Clingendael) in April, “Defence and Covid 19: Why Budget Cuts Should be off the Table”, argues that the economic uncertainties the world will be facing will inevitably lead to new tensions and power shifts, so the logic goes that key strategic capabilities should (will?) be maintained. Bearing this in mind, one could argue that at present the Daman-Saab offer appears to be the best trade-off between price tag and capability requirements; the TKMS offer is too small and the design changes to adapt to the Dutch requirements might be too big of a risk, whereas Naval Group’s Shortfin Barracuda may simply be too expensive and too big.

The Dutch MoD was due to publish its new White Paper in 2020. Undoubtedly, any previous draft is now in the process of being heavily amended to take into consideration potential impacts of the current health crisis. This should certainly give further indications as to which bid will eventually make the cut.
AUTONOMOUS UNMANNED VEHICLES COULD MEAN FEWER LARGE SUBMARINES

Could recent maritime developments in autonomous unmanned vehicles (AUVs) and other unmanned underwater vehicles (UUVs) mean that some of the roles currently carried out by Australia’s Collins Class submarines, including after their forthcoming life-of-type extensions, and the Attack Class currently in detailed design before construction starts, be undertaken more stealthily and as informatively by AUVs at lower cost and less risk to personnel, while having much longer time on station?

AUV’s capabilities include sensors which will supplement, but cannot replace, all of Navy’s submarine fleet. Navy’s large manned submarines in the future will need to be accompanied by numerous AUVs for situational awareness and also to detect, identify and neutralise swarm attacks by an adversary’s manned and unmanned underwater and surface vehicles.

Darren Burroughs, chief technology officer of Australia’s BlueZone Group (BZG) told APDR that: ‘When the Collins Class submarine was in design in the 1980s the number of operational UUVs in the world was nil. Right now, the number of operational UUVs is around 1,000, with about 80% of those having a military application. From the 2030s onwards the undersea battlespace that the Collins and Attack Class submarines will operate in will certainly include many UUVs. It is essential that the Attack Class design considers collaboration with friendly UUVs and the countering of unfriendly UUV forces.’

AUTONOMY RESEARCH PROGRAMS

Autonomous maritime vehicle research is a key strength at both Flinders University in Adelaide and the French Graduate School of Engineering ENSTA Bretagne. Both have been working collaboratively with Attack Class prime contractor Naval Group furthering the defence alliance between France and Australia.

In July 2018, Flinders became the first research institution outside of France to be invited to join CELADON, which is an association of leading industry and academic institutions (including ENSTA Bretagne) that operates land-based and marine facilities adjacent to the French Naval Academy at Brest.

Australia’s Defence Science and Technology (DST) Group’s Maritime Autonomy branch encapsulates ‘vehicle-level autonomy’ (allowing systems to operate independently in unknown environments) and ‘payload autonomy’ (developing intelligent sensor payloads to direct and control specialised vehicle missions).

The branch is focused on applications with high operational relevance and aims to allow the war-fighter to operate in very high-risk environments without being physically present. Their primary research objective is payload autonomy, which utilises custom software to process incoming sensor data during a mission to dynamically influence its execution.

According to DST Group ‘The research involves development of scientific knowledge to enable a shift from rule-based target recognition algorithms to a framework for fully probabilistic autonomy to achieve more efficient information fusion, higher detection rates and fewer false alarms and studies of the performance characteristics of powered and buoyancy-driven underwater vehicles.’

UNMANNED SURFACE VEHICLE (USV) DEVELOPMENTS

Apart from academic research, there is a lot of development occurring within Australia’s defence industry, much of it led by small-to-medium enterprises. Three examples will show how Defence is sponsoring some ground-breaking technologies for future USV operational missions.

Since first meeting Robert Dane, CEO of Australian firm Ocius, at Autonomous Warrior 2018 and observing their Bluebottle USV manoeuvring in Jervis Bay, APDR has been following their developments with interest.

Mid-2019 Robert Dane told us: ‘Our two Bluebottle USVs successfully completed all our endurance and intelligent networking sea trial requirements off Ulladulla, NSW in June 2019 for
our Defence Innovation Hub contract, three months ahead of schedule.

‘An important final test was demonstrating our “visual acuity target recognition and collision avoidance” software. In these scenarios, we put a Bluebottle on a collision course with the Ocius support boat, a difficult to see, low to the water, small, rigid hull inflatable boat (RHIB).

‘Using automatic visual recognition, the RHIB was identified as ‘not water/not sky’ and then positively identified as a ‘speedBoat’. The collision avoidance controller software then plotted a course around the RHIB. The Bluebottle proceeded around it and continued on its way

‘This all happened autonomously such that if the Bluebottle did not have communications at the time, it would avoid the collision and when comms came back it would send photos and GPS to the rest of the team and to the human on the loop.’

In February 2020 the Defence Innovation Network announced a Seed Project grant to Ocius and UNSW as part of the NSW Government’s initiative to support defence innovation.

This project aims to detect and geolocate GNSS (Global Navigation Satellite System) jammers and spoofers in an GNSS-denied environment at sea using low-cost USVs (Bluebottles) that bear extremely low radar cross-section.

As more and more devices on board mobile platforms such as navy ships, land vehicles and aircraft depend on GNSS for communications, position authentication and/or navigation this project is vitally important.

Using Bluebottle USVs as trial vessels, this project will provide a straightforward path to develop anti-jamming technologies for USVs operating in GNSS/ GPS-denied environments and could be applicable to other applications including Unmanned Aerial Vehicles.

For this article Robert Dane told APDR:

‘Our Bluebottle USVs don’t need to refuel, resupply or change crew, can stay at sea for months and don’t get Coronavirus. In 2020 we’re continuing our development and working with UNSW on the Defence Innovation Network project.

‘In the future, we definitely see unmanned systems augmenting manned systems.’

Advances in sensor performance and size means more capability can be packed into smaller and smaller USVs. BZG has just announced results of their sensor fusion trials while deploying a Teledyne Oceancience Z-Boat in Jervis Bay. Equipped with a laser scanner and sonar, the Z-Boat performed a surveillance function, providing valuable information of the above and below water environment in one inspection. Video cameras provided real time feedback to shore.

**USV IN AUSTRALIA**

As well as Ocius’s Bluebottle USVs, BZG’s Teledyne Oceancience Z boat, and others on display at Autonomous Warrior 2018 held at Jervis Bay, another standout performer was Boeing subsidiary Insitu’s Wave Glider, supported in Australia by BZG.

Insitu state ‘These are long-duration AUVs that operate on the surface either individually or in fleets to enable a network of sensors for monitoring and data collection. By reaching over the horizon and enabling real-time communications to sensors and systems below and above the sea, the platform can address many needs across defence missions and maritime security.

‘The Wave Glider can stay on missions 24/7 for months at a time by using innovative wave and solar power energy harvesting.’

BZG recently advised APDR that during 2020 it is expected the first SV3 Wave Glider will be introduced into Australia. The SV3 model offers improved in-water performance combined with increased endurance. The proven and reliable capability of this platform make it an ideal choice for integrating advanced payloads such as acoustic data processing and track processing. Advanced payloads such as these will provide the capability for USVs to contribute to the detection and tracking of submarines.

**UUV IN AUSTRALIA**

Thales and Aquabotix signed an agreement in 2018 for strategic cooperation for the research, design and development of a rapidly deployable mine counter measures, environment assessment and military hydrographic autonomous system mission solution. This could also involve identifying submarines or swarms of adversary UUVs.

This project is in collaboration with Australian academia and SMEs including the University of Sydney, Australian Centre for Field Robotics, Flinders University, Western Sydney University, Mission Systems Pty Ltd & Ineni Realtime Pty Ltd and will focus on the development and integration of Aquabotix’s next generation ultra-portable swarming technology known as SwarmDiver™.

To achieve a variety of missions, swarms of micro-sized SwarmDiver™ AUVs, hosted by a larger USV or AUV.

Boeing’s Echo Voyager is a prototype multi-mission, long endurance, extra-large UUV (XLUUV) designed to act as a complementary capability to maritime forces above, on, and below the ocean surface. Echo Voyager is currently being used to conduct sea trials off the California coastline.

Boeing’s larger Orca XLUUV design, developed in partnership with Huntington Ingalls, has a boxier hull-form more akin to a small submarine and is derived from the smaller Echo Voyager. The partnership is contracted by the US Navy to build four Orcas.

The Atlas Elektronik SeaFox® mine disposal system is being introduced into service by Defence through Project SEA 1778 – Deployable MCM. The highly deployed Atlas Elektronik SeaFox® Mine Neutralisation System offers low ‘entry into service’ risk given 70 ship, 15 portable and six helicopter systems are being delivered, as well as more than 3,000 underwater vehicles.

The RAN’s Huon Class minehunters use Double Eagle UUVs:

‘For their mine countermeasure operations, the ships are fitted with a Variable Depth Sonar capable of detection ranges in excess of 1,000 metres ahead of the ship. When a mine is detected in a water column or on the seabed, the ship will ‘hover’ about 200 metres from the contact. A mine disposal vehicle or clearance divers will then be sent to investigate and neutralise the mine threat.

‘Each ship is fitted with a pair of electrically powered Bofors Underwater Systems Double Eagle mine disposal vehicles equipped with a searchlight, closed-circuit low light television camera and an on-board close-range identification sonar. Commands are relayed via a fibre optic link inside the vehicle’s tether, which also relays sensor images for display on the ship’s multifunction console in the operations room.

‘Each Double Eagle vehicle is fitted with either a disposal charge slung beneath or an explosive or mechanical cutter designed to sever the wire rope or chain holding moored mines.’

Hydroid REMUS 100 (up to 100 metres depth) and 600 (up to 600 metres depth) AUVs, are proven and in-service with 21 navies. Recent advancements to REMUS technology include increased modularity, flexible energy options, improved core electronics, and advanced open architecture features. These technological advancements will provide improved paths to upgrade and allow for the integration of customer or third-party software and payloads.

While operating, especially when some distance from their mother vessel, AUVs need to be protected from enemy action. Threats can come from a variety of sources including submarines, helicopters, fixed-wing aircraft, fast inshore attack craft and other asymmetric threats. Not surprisingly AUVs can also be held up by something as simple as fishing nets.
or sent off on wild goose chases because the mines detected are dummies.

**MARITIME TACTICAL UNMANNED AERIAL SYSTEMS**

The RAN’s 822X Squadron operates the Schiebel S-100 system which consists of one or more remotely piloted aircraft (RPA) and a ground control station with associated antennae and interconnections necessary for RPA command and control.

The S-100 RPA is a small-medium sized vertical take-off and landing aircraft made of titanium and carbon fibre materials, designed to carry multiple payloads simultaneously for up to six hours at a time.

The ScanEagle system, one of the most widely used tactical fixed-wing UAS in the world, consists of multiple RPA, a pneumatic catapult launcher, a Skyhook recovery system, and a ground control system with associated antennas and interconnections necessary for command and control of the RPA component.

The RPA typically carries one primary payload and is of a modular design that allows for rapid changes of payloads and other components. Presently, Navy operates electro optical and infrared primary payloads. Other payloads include visual detection and ranging, maritime automatic identification system and identification friend or foe.

The SEA 129 Phase 5 project is to determine which RPA(s) should be chosen to operate from the Arafura Class OPVs.

As well as existing UAS being operated by 822X Squadron, other contenders include Textron’s 36.4 kg fixed wing Aerosonde which carries a 9.1 kg payload over a range of 75 nautical miles (nm) during a 14+ hour mission.

Leonardo Helicopters has proposed its AWHero rotary-wing UAS for SEA 129 Phase 5. It has a maximum take-off weight of 200 kg, including payload and fuel at 85 kg. Endurance time of six hours within a 50 nm radius can be extended to 100 nm with extra fuel in the payload. The system features automatic deck landing and take-off capabilities.

**INTERNATIONAL LEGAL POSITION ON AUVS**

Anyone who wants to read the full legal description of ‘Maritime Autonomous Vehicles’ within the International Law Framework to Enhance Maritime Security can find it at [https://digital-commons.usnwc.edu/cgi/viewcontent.cgi?article=2907&context=ils](https://digital-commons.usnwc.edu/cgi/viewcontent.cgi?article=2907&context=ils)

The main focus of this work is to deal with the increasing use of AUVs for a variety of ocean activities, which raises challenging questions about how these craft fit within existing ocean governance. Most importantly, there is a need to consider the consequences for international law to maintain a rules-based order on the oceans.

AUVs will potentially fit within the definition of warships under Article 29 of United Nations Convention on Law of the Sea especially where there is some remote control rather than fully autonomous operation. Moreover, an AUV launched from a warship could be viewed as a system of that ship rather than having an independent status.

**WHERE TO FROM HERE?**

Clearly work on autonomous unmanned vehicles in the maritime domain is proceeding apace with some highly effective solutions being tested. These programs will continue as more and more capable autonomous systems are brought into operational use.
DEALING WITH COMPELLING MARITIME THREATS: THE CASE FOR UNMANNED SYSTEMS

Positioned astride the nexus of three great oceans, the Pacific, the Indian and the Southern, Australia has been a contributor to—and has benefited from—the dynamism of the Indo-Pacific region. As readers of Asia–Pacific Defence Reporter are well aware, globalisation has brought unimagined prosperity to the region, and Australians know how connected the country is to the economic fate of the Indo-Pacific.

The statistics that describe the region that stretches, “from polar bears to Penguins, and from Hollywood to Bollywood” covers 52% of the earth’s surface, contains 36 countries (spanning 16 time zones), is home to almost 3.5 billion people and boasts the world’s three largest economies (China, Japan and the United States). The region contains the largest democracy (India), the most populous nation (China) and the world’s largest Muslim-majority nation (Indonesia). Over $5 trillion in global trade pass through the South China Sea each year.

But with this prosperity comes potential danger. The Indo-Pacific region is home to six of the world’s largest militaries and a number of nuclear powers. There is simmering tension that has often resulted in violent clashes. For example, there have clashes between China and Southeast Asian nations in the South China Sea; disputes between China and Japan over the Senkaku Islands in the East China Sea; North Korea’s sinking of the South Korean warship Cheonan; as well as other areas of conflict; to say nothing of ongoing illicit trafficking in people, weapons, drugs, and weapons of mass destruction.

MINE COUNTERMEASURES: NOT A NEW CHALLENGE

Having served in uniform in the U.S. Navy for thirty years, and now through work as a USN civilian analyst, this writer is keenly aware of the threat that naval mines pose, as well as the fact that they can stop any naval operation—or merchant activity—dead in its tracks. An adversary, be it a nation or a terrorist group, does not need sophisticated delivery systems to dump deadly mines into a littoral region— or even into a harbor.

As a nation that is also an island, Australia is especially vulnerable to sea mines. With a coastline of over 35,000 kilometres (with another 23,000 kilometres if islands are included), and with most major cities on the coast, there are many ways for an adversary to disrupt trade going into and out of one of Australia’s major ports such as Sydney or Fremantle by using naval mines. Add to this Australia’s Exclusive Economic Zone of well over eight million square kilometres (the largest such area among all nations) which helps provide for Australia’s livelihood, and the challenge becomes even greater. Such a threat strains the resources of the ADF and RAN.

One need not be a Clausewitz or a Sun Tzu or a student of geography to understand how vulnerable Australia is to sea mines. As a maritime nation critically dependent on trade, Australia may well be more vulnerable to this threat than other nations. Therefore, it seems logical that in addition to well-reasoned long-term projects to enhance the RAN’s ability to hunt for and neutralise mines, shorter-term solutions using commercial-off-the-shelf (COTS) technologies deserve serious consideration as potential methods to mitigate the treat of mines to Australia’s security and prosperity.

Few naval professionals would disagree with the statement that mines—“weapons that wait”—represent one of the most difficult military challenges. Sea mines are perhaps the most lethal form of these weapons. In terms of availability, variety, cost-effectiveness, ease of deployment and potential impact on naval expeditionary operations, mines are some of the
most attractive weapons available to any adversary determined to prevent naval forces from achieving access to sea lines of communications or the littorals.

In the past several decades, rogue states have indiscriminately employed sea mines. Libya used mines to disrupt commerce in the Gulf of Suez and the Strait of Bab el Mandeb. Iran laid mines to hazard military and commercial traffic in the Arabian Gulf and Gulf of Oman. During Operation Desert Storm, the threat of mines precluded the effective use of an expeditionary task force off the shores of Kuwait and hazarded coalition forces operating in the Arabian Gulf. The threat posed by mines was so extensive, that clearance operations in this confined body of water were not completed until 1997.

Today, the threat posed by potential adversary mining capabilities is even greater. The number of countries with mines, mining assets, mine manufacturing capabilities, and the intention to export mines has grown dramatically over the past several decades. More than 50 countries possess mines and mining capability. Of these, 30 countries have demonstrated a mine production capability and 20 have attempted to export these weapons. In addition, the types, sophistication, and lethality of the mines available on the world market are rapidly increasing.

LEVERAGING EMERGING UNMANNED VEHICLE TECHNOLOGIES

The U.S. Navy has dealt with the extreme challenge of putting manned naval vessels in sea areas where mines are present—witness the severe damage done to USS Samuel B. Roberts, USS Tripoli and USS Princeton. MCM is one of the most difficult and time-consuming missions for navies to successfully execute. Therefore, the USN is making a strong pivot to unmanned vehicles as a primary part of the Navy’s MCM solution set and to “Take the Sailor out of the minefield.” Australia—as well as other nations—can easily capitalize on work already done by the USN to fashion a robust, near-term MCM capability.

The U.S. Navy is leveraging—and combining—technologies that have been examined by commercial and other government agencies, and tested extensively in Navy exercises, experiments, and demonstrations, to field a near-term MCM capability. This “try-before-buy” methodology has served the USN well, and has set the stage for achieving a near-term solution for dealing with deadly mines.

Over the past several years, in a series of Navy and Marine Corps (and other Service) events as diverse as the Ship-to-Shore Maneuver Exploration and Experimentation and Advanced Naval Technology Exercise (S2ME2 ANTX), the Battlespace Preparation in a Contested Environment, the Surface Warfare Distributed Lethality in the Littoral demonstration, the Citadel Protect Homeland Security Exercise, Dawn Blitz, Steel Knight, Military Ocean Terminal Concept Demonstration (MOTS CD), the Bold Alligator exercise series, and Valiant Shield, operators have field-tested a diverse number of emerging technologies.

One of the technologies that performed well was the MANTAS unmanned surface vehicle (USV). During the events described above, the MANTAS was scaled-up from a six-foot, to eight-foot, to twelve-foot version. As part of Exercise Valiant Shield, it was tasked with a re-supply mission, carrying cargo from a Military Sealift Command logistics ship to the troops ashore. As a result of that mission success, U.S. Navy and Marine Corps officials have asked the manufacturer, MARTAC Inc., to scale-up the MANTAS further and design a thirty-eight-foot version.

It is this USV—one that closely approaches the size of an eleven-metre rigid-hulled inflatable boat (RHIB) used by many navies—that can be combined with surface and subsurface mine-hunting and neutralizing equipment to provide an over-the-horizon “single sortie detect-to-engage” MCM capability. This solution set takes the sailor out of the minefield and provides a potential solution for this challenging mission. While there are any number of USVs and UUVs that the U.S. Navy is testing, from my perspective, leveraging one that has been thoroughly wrung out for hundreds of hours during years of Navy exercises, experiments, and demonstrations provides the most important building block for a comprehensive MCM capability.

Putting the Pieces Together to Field a Near-Term MCM Capability

The first component of a COTS MCM solution is a scaled-up version of the twelve-foot MANTAS high-speed catamaran described above. This USV–nicknamed the T38—is virtually identical in size to an eleven-metre RHIB carried by many ships. The T38 can operate in up to sea state five, has a cruise speed equal to that of an eleven-metre RHIB, a much higher burst speed, and a range four times greater. Importantly, the T38 has an aft-mounted twin tow station, which will house both a mine-hunting sonar system and a mine neutralisation remotely-operated vehicle (ROV). These towed subsystems are installed on two rails in an open area aft. The catamaran hull allows for an angled submergence of the stern tow station, thereby putting it into a flooded well-deck type configuration enabling a simple launch and deployment.
recovery of the tows.

The second component of a COTS MCM solution is towed-body-mounted sonar designed to search for mine-like objects (MLOs). A typical COTS sonar can survey at a resolution sufficient for MLO classification, and is programmed for bottom following, terrain referencing, and obstacle avoidance. Automatic Target Recognition will identify likely MLO anomalies, which will then be presented in near-real-time to the man-on-the-loop for verification as a MLO. Verified MLOs will be added as a waypoint for validation, while invalid MLOs will be discarded.

The third component of a COTS MCM solution is a Mine Neutralisation System (MNS) Remotely Operated Vehicle (ROV). Verified MLOs will be continuously updated to a recommended route for the MNS ROV. This route can be influenced by the watch team for various priorities. After the area search is complete, the T38 will transition from hunting to neutralising by conducting a stern submerged well-deck recovery of the tow-body which will be immediately followed by the launch of the tethered MNS ROV.

The MNS ROV then performs the “dull, dirty and dangerous” work previously conducted by various classes of ships by providing real-time video validation of mine-like objects. The MNS ROV autonomously executes the MLO route for final classification and man-on-the-loop validation of each MLO, while the T38 shadows and supports it as an over-the-horizon communications link. The classification, validation and engagement processes are then repeated until the field is cleared. This is a COTS solution that effectively solves the “single sortie detect-to-engage” challenge.

There appears to be a compelling need to creatively apply new, innovative technologies to address the operational and tactical challenges posed by naval mines, as well as the need to expand the use of unmanned systems to tackle MCM challenges. The ability to meet this need with commercial-off-the-shelf hardware and software—and not wager solely on emerging technologies that will take years to develop, mature and field—might well be something for the RAN to consider as it seeks to accelerate the deployment of an effective MCM capability. Using COTS technology to field a near-term solution and put it in the hands of RAN sailors now, not only fields a capability quickly, but enables those same sailors to find ways to make the system even better.

The U.S. Navys guided missile frigate USS Samuel B. Roberts (FFG 58) (center) and nuclear powered Los Angeles-class attack submarine USS Baltimore (SSN 704) (top) pull alongside the nuclear powered aircraft carrier USS George Washington (CVN 73) during a battle group formation exercise, July 17, 1996. (Navy photo by Photographer’s Mate 1st Class Greg Pinkley)
The second component of a COTS MCM solution is towed-body-mounted sonar designed to search for mine-like objects (MLOs). A typical COTS sonar can survey at a resolution sufficient for MLO classification, and is programmed for bottom following, terrain referencing, and obstacle avoidance. Automatic Target Recognition will identify likely MLO anomalies, which will then be presented in near-real-time to the man-on-the-loop for verification as a MLO. Verified MLOs will be added as a waypoint for validation, while invalid MLOs will be discarded.

The third component of a COTS MCM solution is a Mine Neutralisation System (MNS) Remotely Operated Vehicle (ROV). Verified MLOs will be continuously updated to a recommended route for the MNS ROV. This route can be influenced by the watch team for various priorities. After the area search is complete, the T38 will transition from hunting to neutralising by conducting a stern submerged well-deck recovery of the tow-body which will be immediately followed by the launch of the tethered MNS ROV.

The MNS ROV then performs the “dull, dirty and dangerous” work previously conducted by various classes of ships by providing real-time video validation of mine-like objects. The MNS ROV autonomously executes the MLO route for final classification and man-on-the-loop validation of each MLO, while the T38 shadows and supports it as an over-the-horizon communications link. The classification, validation and engagement processes are then repeated until the field is cleared. This is a COTS solution that effectively solves the “single sortie detect-to-engage” challenge.

There appears to be a compelling need to creatively apply new, innovative technologies to address the operational and tactical challenges posed by naval mines, as well as the need to expand the use of unmanned systems to tackle MCM challenges. The ability to meet this need with commercial-off-the-shelf hardware and software—and not wager solely on emerging technologies that will take years to develop, mature and field—might well be something for the RAN to consider as it seeks to accelerate the deployment of an effective MCM capability. Using COTS technology to field a near-term solution and put it in the hands of RAN sailors now, not only fields a capability quickly, but enables those same sailors to find ways to make the system even better.

A CHALLENGE DEMANDING ACTION TODAY

It is clear to this observer that the ADF and RAN are keenly aware of the imperative to develop a robust MCM capability. If the technical and operational solution presented above sounds simple and achievable it is just that—a capability that exists today in commercial subsystems that can be delivered far more rapidly than anything the traditional acquisition system can provide. The RAN’s ships and sailors operate daily in harm’s way.

Australia needs to embrace an unmanned solution to dealing with deadly mines. While complex programs of record continue to develop next-generation technology, the RAN would be well-served to invest in parallel-path solutions that leverage mature subsystems and put them in the hands of RAN sailors—sailors who can finally stay out of the minefield.

The ADF and RAN are recognised as “smart buyers” of military technology, and the primary platform of the COTS MCM solution described above, the T38 MANTAS USV will be in use during the Trident Warrior portion of the upcoming Rim of the Pacific (RIMPAC) exercise in July 2020. This will be a propitious opportunity for the RAN to examine how it can leverage emerging technology to field a near-term MCM capability.
SWEDISH EXPERTISE AVAILABLE FOR COLLINS LIFE-OF-TYPE EXTENSION

The close connection between the navies of Sweden and Australia goes back to the mid-1980s when the evaluation of offers for what became the Collins class entered its penultimate phase. The Swedish company Kockums – then partially owned by the Government – was selected in May 1985 as one of two finalists, along with HDW of Germany. The Royal Swedish Navy (RSwN) played a crucial role in helping Kockums win the contract, not only by supplying a huge amount of classified data about performance characteristics but also by showing a willingness to engage with their Australian counterparts in an open and constructive way.

The submarine contract was awarded in 1987 and this was followed only two years later by another Swedish company Celsiustech – now Saab Australia – being selected as the combat system supplier for the ANZAC frigate program. This system – the clunkily-named 9LV – had been developed for the RSwN and this pedigree was a major ingredient in its selection. 9LV is a huge success story with much of its evolution and development subsequently taking place in Adelaide. It is now on all RAN surface combatants and will be on the new Hunter class frigates.

Regarding the upgrade of the Gotland class – what is the overall status of the program?

The upgrade is proceeding and will see delivery, after concluded sea trials, of HSwMS Gotland in mid May 2020 and HSwMS Uppland in November 2020. The coming defence bill is pending governmental decision but will hopefully see a MLU of the third boat in the Gotland class – HSwMS Halland.

What capability improvements have resulted in the upgrade?

Since the mid-life upgrade of the two Gotland class submarines are mainly obsolescence-driven, the improvements will be numerous in that the common system solution set-up between the MLU Gotland and the new A26 class will add several new improvements. The capability improvements cannot only be seen in terms of design and technology, which by definition can only facilitate added value. I believe the greatest impact and actual added value will in the short term be seen in areas of operational availability as well as tactical adaptation in how we will operate the submarine. In the longer term will see a much easier and almost seamless transition for the crews between the Gotland MLU submarines and the A26 and thus allow us to reach full operational capability, with the latter submarine, in less time than we are used to when going from one submarine class to another.

Will the upgrade extend the service life of the submarines – if so, for how long?

Yes, absolutely. The MLU will see the two Gotland (HSwMS Gotland & HSwMS Uppland) class submarines in service beyond 2030.

Often the question is asked, rather than upgrade a platform why not spend that money on a new one? What was the logic behind the decision to upgrade rather than replace?

I believe the decision rests upon a dual logic. The first one is of course money. Sweden is a small country and submarines, as for all countries, have always been expensive acquisitions. In this all acquisitions are subjected to the operational, effect of the entire Swedish armed forces and thus seen in the larger picture - coupled with the fact that we didn't have a shipyard at hand for building submarines for many years made it harder to push a case to build new submarines or surface ships.

At the same time the Gotland class submarines as well as the Visby class corvettes proved time and time again that they still kept their operational relevance intact. Normal degrading in structure and signature was successfully kept to a minimum with good monitoring, overhauls and system replacements. The Gotland submarines are a better submarine today than when they were first delivered in the late nineties.

Is there a technology connection between the Gotland upgrade and the new A26 class – or are they completely separate programs?

We are equipping the MLU Gotland class with a number of systems designed for the A26. We are not only bridging a technology gap between two submarine classes but also allowing for our crews to adapt earlier to new equipment. This will result in giving the crews the ability to “jump” between the two future submarine classes in the Swedish Navy and creating a redundancy and independency in that all crew members can serve on-board all submarines. It will also allow for us to faster reach full operational capability with the A26 when delivered.
Given that Australia’s Collins class are something of a ‘big brother’ to Gotland, is the RSwN in a position to assist the RAN with the proposed LOTE?

Both Collins and Gotland are similar in that they both derive from the Västergötland class submarine. Both classes have similar design solutions and they are nearly the same age and as we now are in the final stages of a MLU on the Gotland class submarines, to see them operational beyond 2030, there are most likely experiences in this that can be of value to the RAN Collins LOTE.

Looking to the A26, what is the overall status of the program? When does the RSwN anticipate taking delivery of the first of class?

When building a new class of submarines, the first in 20+ years, and at the same time transitioning the shipyard from maintenance yard to a combined maintenance and shipbuilding yard, it takes time. The two A26 are planned for delivery in mid-20’s. I believe however, that some patience regarding the dates is called for but we are really looking forward to our new submarines and their operational capabilities.

Are there plans beyond A26 so that Sweden returns to the historic pattern of having a rolling build of submarines?

That is a question for the political level. However, I firmly believe that a combined, submarines and surface ships, rolling pattern of continuous shipbuilding is vital. It is vital in several contexts – first we need to recreate a shipbuilding foundation that can retain a national proficiency and knowledge over time, second we need to get back on top of technology advances and implement this into the systems on-board our ships and submarines and lastly we need the dynamic of continuous ship building to replace ageing ships, in a due time, and thus keep the navy operationally relevant over time.
Kym: Let’s start with SEA 1000. How do you see the potential role of Thales in that one?

Chris: SEA 1000 involves a level of competition for the various elements that interest us, so I can’t comment directly on ongoing evaluations. However, there are a few important points I would like to make. If you look at all of the programs that are currently running in the Australian naval domain – surface ships, submarines, the future of mine warfare – these capabilities are dependent on the brainpower that can be applied to them.

While the platforms are receiving the bulk of the coverage – and I understand why – it’s the systems that equip them that bring them to life and give them the capabilities that are needed. These might not be visible, but they are vitally important. This contextualises where Australia needs to be on all of these large maritime projects. We really need to ensure that we preserve and build on the “smarts” that are so critical to delivering solutions.

We also need to be able to adapt very quickly so as to be able to take up emerging technologies because they are advancing rapidly. The needs not just of Navy but of the entire defence forces are going to change quickly in the future – just look at the situation we are in right now with COVID-19.

The platforms themselves will change over time to some degree, but their systems and sensors will be available for a myriad of potential upgrades during the same timeframe. This applies not only to SEA 1000 but just about everything else as well. Looking at sovereign capability, it is absolutely critical that we have the brainpower to be able to implement these types of improvements.

In Australia we already have significant capabilities in the smart systems domain. If we look at what Thales is doing on sonar systems in particular, we are producing world-class transducers – which are a critical component. The investment that Governments have made collectively on programs like Collins submarines, ANZAC frigates and the minehunters has seen the development of cutting edge sensor technologies.

That kind of capability is something we’re very focused on at Thales – and hopefully future programs will continue to build on the existing base.

People outside the defence sector might not even be aware of the skill set that Australia has – but in some areas we have been doing this for decades – and the current round of projects going through must build on that. We must not dilute that.

Kym: Thirty years ago the local content challenge for defence projects was very much on the software and sensor part of the equation. It’s different now with talented companies such as CEA and EOS and numerous others.

Chris: Yes. If you look back over that relatively long period of time we’ve seen all those things progressing and building in capability. It’s really important on the sovereign capability side of things, that there’s an equal, or even greater focus on the systems and sensors than platforms. Australia needs to have a level of self-reliance to be able to adapt and evolve the capabilities that Defence needs to be able to gain and maintain warfighting advantage when needed.

When you look back 30 years ago, there wasn’t nearly the broad based depth of knowledge and capability in Australia as there is now. That’s been built as a result of 30 years of investment – by taxpayers and by companies.

Kym: Is Australia large enough to support internal competition for orders or should we be looking at another approach?

Chris: I think competition’s not a bad thing, if it helps make industry more efficient. One of the things that we’re working very strongly on in Thales is that Australian industry needs to be globally competitive, otherwise it’s just not sustainable. Otherwise it’s not fair to the taxpayer and it’s not fair to Defence budget. The first point is, competition is healthy in as much as it generates that drive for efficiency. I think it’s an essential component.

What is also important is complementing that competitive process with good policy. Government, I think, has put in place good policy with good intent.

The combination of a competitive environment, plus good guidance and the application of policies to ensure sovereign capabilities are built up needs to continue - particularly in these areas of the smart systems. There has been a lot of discussion focused on platforms and in my view this can miss the full picture.

There are local companies like Thales that are exporting. They’re companies now with core technologies - right down to the atomic level in a lot of areas - and we’ve generated capabilities that the rest of the world has not been able to. That’s a real advantage - we’ve been able to export very substantial amounts of really leading edge technologies in sonars, mine countermeasures and a range of capabilities to Australia’s strategic partners.

The idea that competition actually help drive that I think is terrific. It’s helped make Australia stronger through that process. As long as the competitive process and the guidance is there from government to apply the policy of generating those sovereign capabilities, I think it’s a very healthy thing.

Kym: Can you give some examples of those Thales export orders? I know what some of them are, I just don’t know whether they’re public.
Chris: We’ve been exporting sonar sensors to submarine programs in Europe - both in France and the UK – and we have been supplying to those for several years. To be able to build those sensors – which are engineered right down to the atomic level - that’s Australian knowledge, that’s Australian capability that’s enabled that.

It’s a great example because there is nothing more important to a nation in its defence arsenal than submarine capability. Those sonar sensors are absolutely vital to the performance of the submarine.

Another example: last year we secured some quite significant orders in India and South Korea for mine countermeasures. These are the systems that have been jointly developed with the DSTO back in the 1990s, and evolved since then. During last year we secured more than $110 million worth of export orders just for those mine countermeasure systems in India and South Korea. We have also exported many of those systems right around the world to quite a number of other countries.

It does show you that Australian capabilities are very competitive - globally competitive - and we have succeeded in the world markets because of the high performance of the systems we have developed.

Kym: With those mine countermeasures, is that the Dyad influence sweeps that you’re referring to?

Chris: Yes. Dyad and AMAS for the acoustic generators as well. It’s a great story. DSTO design work, great people such as Warren Canning, and folks like that, working on these systems, partnering with industry. DSTO doing the research and early development work, partnering with industry to make that research into a developed producible capability. Industry then turning that into a cost-competitive capability – and able to deliver improvements as mine threats have changed. That’s a fantastic example of joint work between what’s now DST group, and industry.

Kym: Excellent. All right, next one on my list - Collins. I assume that the Thales Scylla Sonar suite is going to be there for a while longer.

What’s happening there?

Chris: We are deeply involved in the upgrades to extend the life of the Collins. I’m not going to go into too much of the detail, for obvious reasons. However, I can say that the sonar system has been upgraded, and in quite important areas, both the flank and bow arrays. The towed arrays are also being looked at for upgrades also.

Some of the old stories of Collins and its early problems getting into operation seem to linger much longer than the facts around how the submarines operate. Today, Collins is an extremely capable submarine and has been for some time.

With the upgrades that have been made, the capability enhancements that have been added, Collins continues to be a very capable submarine. It’s one of the things I’m extremely proud of, to have been part of a program like that since the mid 1980s, when we were doing a lot of the development work with DSTO on the towed arrays. We were bringing together a unique and very advanced high performing capability for Australian submarines. It’s something Australia should be proud of.

Kym: Do you see any scope for technology from Collins flowing through to the Attack class? Maybe use Collins as a test bed? I know that’s more a question for Navy, but you’re obviously close to it all.

Chris: I think everything about Collins from the technology on board to its mode of operation is being looked at in a context of how it applies to the Attack class. Every element of Collins is being looked at from that point of view. There are lots of lessons learnt and lots of elements that will probably find their way into how the Attack class systems are going to be operated.

To be honest, Kym, they are decisions for Defence - and I think it’s a very logical and clear transition of capabilities, from the upgraded Collins, through to the Attack class. There’s certainly an opportunity there, and I’m sure that’s not being missed by Defence.

Kym: Turning to SEA 5000, what’s the latest?

Chris: It’s progressing reasonably quickly. The current circumstances with COVID have required some different ways of working, But, overall it seems to be progressing reasonably well.

One of the points of highlight is that the Thales component is a variable depth sonar. There’s a towed array receiver and there’s a very important low frequency projector, which is deployed from the ship and allows the ship to use very high energy low frequency sound below the thermal layer. This makes the ships potent ASW platforms. That variable depth sonar, or that particular component, is called the CAPTAS system.

The reason I’ve mentioned that is because it’s actually the core of why the ASW performance of that ship is so good. The second reason is the low frequency projector system in it - we’ve been producing that in Australia since 2008 and 2009, both for the UK vessels and also the French ships.

SEA 5000’s going to be a great ASW capability, in the surface ship domain. It will be an apex predator - that’s not me saying it, it’s a quote from the Royal Navy. When this system entered operation it changed the game. Now a surface ship, with its low frequency projector capabilities, is able to effectively search the undersea environment very effectively. Any submarines in that area know they’ve been lit up, because they can also pick up on that low frequency signal. So, it’s quite a game changer for a surface ship.

Kym: Next: ANZAC frigates. Is anything happening there from the Thales perspective?

Chris: There have been upgrades to the Spheron hull mounted sonar. The capabilities of it have been advanced and enhanced, which is good. I think there’s great potential for the ANZAC to increase its ASW capabilities. There was a period of time, not that long ago, where people were less focused on the ASW side of things and were more concerned by missiles and above water attack.

I think it’s very important that there’s been a refocusing on ASW capability in our surface ships.

Kym: When you look at the timelines the last ANZAC will still be in service in the late 2030s.

Chris: Yes, that’s exactly right. And I’ll say again the submarines risk in the region is growing - and there seemed to be a period where it was overlooked. There has now been a review of that, so there are good opportunities to enhance the ASW capabilities of the surface navy.

Kym: All right, to mine warfare the MHCs. It has been put to me that Thales priced itself out of upgrading the Huon class minehunters.

Chris: I think that the amount of work required to hit the full scope of the upgrade that was requested - yes, it would require a large budget. A lot of that was to do with systems renewal, obsolescence management - all of those kinds of things, which is important. Some of the requirements were linked to a change of standards. To change a vessel from the 1990s to the standards of 2020 was going to be quite expensive. There was a lot of work, which was beyond Defence’s original scope.

Running parallel to that, there’s been fairly rapid advances in autonomous mine warfare, and those are coming quite quickly. We’re involved in SEA 1778, to introduce an autonomous mine warfare capability. Those systems get tested, exercised, operational modes get developed. We’re seeing a very important opportunity recognised by defence, to take advantage of this new technology coming through.

Keeping the Minehunters running is very important - they’re performing exceptionally well and our team have been working very effectively with Navy and with Defence to keep the Minehunters operating at high
performance, and high availability, and that's great. But, running in parallel to this, will be the advance of autonomous systems that the Navy would like to deploy sooner rather than later, and get the people away from danger. That's the idea - get the sailor out of harms way.

Kym: The concept of autonomous systems has been around for a while, but how close to reality are they?

Chris: There's quite a lot of systems around the world being developed – but there are fewer systems getting deployed. But autonomous operations - those things are being largely driven by the evolution of commercial technology in general. It's now a matter of how they can be used by navy and how do they work most effectively with other naval assets.

Programs like 1778, as I've mentioned, are working towards that. So, it's really good to see that Defence are looking at the advanced technologies, and not just continuing to use the previous generation of mine warfare capability on the Minehunters.

The Minehunters, I think, will keep going for a while longer. They're doing some really important stuff in the Navy's mine warfare domain - make no mistake.

Beyond that, the national expertise in mine warfare built up over many years, decades in fact, involving DST, industry and Navy as a team, gives Australia a real benefit in this area. The way we've been able to adapt the systems, in response to regional conditions and the changing strategic landscape provides a strong platform to adopt new technology for the future. It's where we need to be the most agile. The systems are the area we need the most agility.

To be honest, while of course we rely very heavily on strategic partners, and that's important, but that's not always going to work in the strategic direction that Australia needs, or the technology and industrial capabilities that Australia needs, in-country, for its operational advantage. And so, having these capabilities in Australia, I think is exceptionally important.

Kym: Sure. And also, some of our strategic partners have budget orders of magnitude larger than ours. And their solutions, therefore might be unaffordable.

Chris: That's true, but there's also, I think, advantage in their budgets developing technology that we can learn from, and tech transfer to Australia, and then create the local capability to adapt and sustain those technologies. But, I guess, the thing is, we don't want to be locked in to technologies that might by orphaned by the parent nation, and left to basically be frozen in time.

Australia needs those technologies to be advanced and adapted in accordance with our national needs. So, having the local capabilities, and having the technology transferred into Australia, so that we can make those changes and evolve the systems is really, really important. We don't want to be just a receiver of technologies ... particularly when technologies are changing rapidly. We don't want to be receivers of technology that's suddenly orphaned after a relatively short period of time, or even a 5 to 10 year period. It's possible, and we've seen it happen. It's not something that Australia should be subjected to. It's something we need to have a degree of self-reliance on.

Kym: Sounds good. All right. Shall we do land stuff?

Chris: Mm-hmm (affirmative).

Kym: Let's switch domains now and talk about Land projects. How is Hawkei coming along?

Chris: The headlines ... and I don't think Defence would mind me saying this ... the vehicle has been through rigorous testing and the production line in Bendigo has been well established over the last 18 months. I think it's a very advanced production line by the way, it's absolutely worthwhile visiting.

Everyone received at the facility is massively impressed. We've built circa 150 vehicles already. And we've just recently been proud to announce we have stepped up to building two vehicles per day.

In parallel to that, we're working very closely with our Defence customer to have all of the other essential elements of the program completed in parallel with the build. This includes supportability, configuration management, all of the elements that create a full defence capability that can be sustained for its life. All those things are being generated in parallel.

We have a really great working relationship with Defence. I think everyone in the army is quite excited to get the vehicles. People are very enthusiastic about the Hawkei. I mean, it's a great vehicle, and to think that it's being created by an Australian industry working with quite a number of partners, it's a phenomenal story.

The reliability testing has taken longer than we originally planned, which means that the workflow into some of our supply chain has not been at the timeframe that everyone was looking forward to. But our Australian SMEs have been incredible partners. I really, really just want to say thank you to our SME partners - particularly the Australian supply chain end of it. They've been great throughout this.

We're in that really nice zone now, where the production handle is turning, and hopefully that means a good workflow, and hopefully some cashflow into the supply chain as well.
Kym: Anecdotally, I know there is a lot of support in Army for this, with an emphasis on it being more like a protected computer rather than a traditional vehicle.

Chris: It’s a smart system. The vehicle is one thing, and it protects the soldiers so that they can do their operations with a great deal of confidence and assurance of their safety. I reckon that’s great.

It’s like the Bushmaster story, but with Hawkei, it comes fitted with the very important integrated computing system - and that allows it to be an incredibly potent force multiplier for defence. Both Chief of Army, Rick Burr, and Chief of Defence, Angus Campbell, are very enthusiastic about what they’ve seen when they visited our Bendigo site. And I have to say, all our people at Bendigo have been really inspired and motivated by those visits, when they see the enthusiasm of the Defence users, and understand the importance of the capability we’re building.

Kym: Any export prospects? Is there anything that you’d like to discuss there?

Chris: On vehicles generally, there’s a very important program in the United Kingdom, called the Multi Role Vehicle-Protected Programme, MRV-P and we’re in the competition. I hope we’re well placed, but I don’t know. Unfortunately we’re disappointed to hear that it’s been delayed by 12 months.

Also a lot of interest continues in Bushmaster. We have already exported to the Netherlands, the U.K., Indonesia, New Zealand, Jamaica and Japan. With Hawkei also becoming operational in Australia, I think that strengthens our export chances.

Kym: To weapons: is it the F88, or are you up to the EF90 - what’s the nomenclature that you’re looking at for the current generation of rifles?

Chris: Just F90, is probably the easiest way to talk about it. The rifle’s performing exceptionally well. Again, the feedback from Army, and from our Chief of Defence on the F90, has been very positive. The reliability, the accuracy, and the fact it’s a very adaptable rifle in terms of its different barrel lengths, and in terms of how it can be used. I think that versatility has been a really major factor for the enthusiasm about the F90.

Again, this is about industrial capability in Australia, typically to Defence’s capability advantage. If that industry didn’t exist, then Australian needs would be subject to what other countries prioritise. There is a book by Chris Masters that is absolutely well worth the read. It’s called Sticking To Our Guns, and it’s a great story, really. It was commissioned by CASG and produced by ASPI, basically to tell the story of how the procurement process, the development process, all comes together - and sometimes doesn’t come together.

Kym: The army specialists tell me that they’re able to engage targets out to 600 metres, whereas previously it was about 300. And engage them with great accuracy.

Chris: That’s correct. Again, it’s down to great design, precision production, and we have a dedicated workforce, a real set of experts in Lithgow able to generate those kinds of results. And again, Kym, it is world leading product performance. Hopefully in the future we’ll see export opportunities as well.

Kym: We have covered sea and land – so now it’s the turn of OneSKY. Could you update what’s happening on that one?

Chris: Sure. OneSKY is progressing according to plan. The way the system comes in to being, is that the first part to go live is with the Air Force. The second system is with Airservices Australia. So, we do the defence capability first, and then the civil airline air traffic management system, second.

We went through preliminary design review last year successfully. This year, we have critical design review. The system evolution in terms of software is ahead of schedule. So within the OneSKY system, you have the CMATS, Civil Military Air Traffic Control System. All that development work for software generation is ahead of schedule, which is great, and it’s going really well.

We’re starting the rollout process with Defence sites this year, so we’re building up our project team now to support the deployment of the air force systems.

It is a very busy year this year. We’ve got over 300 people now, working on the project in Australia. Interestingly - and with the COVID-19 issue – it is worth mentioning, I guess in the environment, nothing has stopped progress in Australia.

Right across Thales Australia, no aspects of production, no aspects of project development, has been halted. Everything has continued with essential people in our production facilities working safely with new practises, really different practises, but absolutely safe. And then anyone who can work from home is working from home - we have nearly 2,000 people working from home with the IT systems deployed, and the engineering tool sets deployed. Really incredible workforce mobility and mobilisation in a difficult situation.

So, back to the OneSKY team – that’s 300 people, largely working from home, and continuing that capability generation at this stage. We’re hoping, of course, people will be able to move from their home office back into their normal office soon. However, it’s great to see that people have been able to adapt, and continue to work effectively.

Kym: Just with COVID-19 - because it is the topic du jour- I’m hoping that, if there’s a benefit from it, it’s going to be that in future if people prefer to work from home, there might be greater scope for that.

Chris: I agree. And I think it’s also allowed organisations, companies, and the government as well, to work through things that are really important in operating the business, or the organisation. That is: what are the things that really add value, what are the things that we’ve had to do without, and are actually finding that we’re not actually missing some of those things. It could be different ways of meeting, the way we interact, processes, a whole range of things that people will be able to look at differently now that we’ve actually done this, and seen that there’s quite a few advantages in the work-from-home arrangement.

Kym: Final observations?

Chris: One of the other positive things coming from the COVID pandemic, is the realisation that being absolutely interwoven into global supply chains, and the global networks while the world is working normally, that’s a very effective and good thing. But what it has shown is that, when the world’s not working normally, and that might not just come from a pandemic, it can come from any number of disruptive factors, those global supply chains are vulnerable.

So, the need for greater self-reliance, and particularly the need for industrial capability, is being demonstrated very clearly during the COVID crisis. We have all had contingency plans but now that we’ve had to deal with a pandemic for real, I’m really hopeful that everyone has learned from it in terms of the need for self-reliance. From the Thales perspective we’re encouraging investment in the manufacturing sector, encouraging all the policies that will generate the next generation engineers and scientists that help make Australia’s industrial capability the advanced capability it needs to be.

So, from my point of view, COVID’s done a lot of things, but hopefully it’s shining a light on that need for a degree of self-reliance in industrial capabilities - and it’s something that will hopefully be sustained after the crisis ends.
SEA MINE COUNTER MEASURES IN THE RAN 2020 – PART II

In last month’s edition, a summary of the present state of play in the RAN’s Mine Countermeasures capability was provided and concerns were raised as to the wisdom of pursuing an all or nothing approach to Autonomous Systems. These two ships are to be built under SEA 1905 in WA and it is understood they will be constructed of steel without any shock hardening, degaussing or acoustic silencing: a high-risk approach for an MCM vessel. In this second instalment, a position is put for a more balanced approach to maintaining and regenerating the failing MCM capability of the Royal Australian Navy.

OTHER WORLD NAVIES

The Royal Navy (RN) and United States Navy (USN) will continue to retain dedicated MCMVs into the near future at least, whilst both push on with introducing new autonomous capabilities (the RN in concert with the French Navy have an ambitious program running now). The Belgian and Netherlands navies are about to embark upon an equally ambitious venture with a new platform that will carry a range of unmanned systems. These vessels will, however, have MCMV qualities and design features such as shock resistance and degaussing and low acoustic propulsion options.

It is important to note that these countries reside within the NATO umbrella, (and Western aligned Euro friends) and have in their team a whole host of navies that will still be operating dedicated MCMVs out into the 2030’s and beyond. Just to put this all into perspective; amongst these navies in Western Europe, there are over 90 dedicated MCMVs practiced and capable of conducting MCM operations along a coastline no longer than that of eastern Australia.

The most credentialled Navy in MCM is arguably the German Navy, which has recently made the decision to increase its MCMV fleet with an additional 11 new ships to augment those presently in service. These new MCMV ships will be shock hardened and capable of operating in a mine danger area. They will have the capability to conduct standoff operations with autonomous systems as well as prosecute mines inside the minefield with onboard sensors and effectors. To our north both Japan and South Korea have extensive dedicated MCM vessel fleets and are building more. These navies in particular, have capable minesweeping systems to combat the difficult conditions they must deal with in their area of operations. The RAN needs to be reminded that a number of Australia’s priority ports are in very challenging locations, frequented by high tides, tidal streams and muddy bottoms - all of which make life very difficult for autonomous systems.

The Singapore Navy has recently completed an upgrade to its Bedok Class mine hunters which include expendable mine neutralisation systems from ECA France, a new Mine Hunting Sonar and a towed synthetic aperture sonar both from Thales. The RSN has also developed an indigenous 16 metre Unmanned Surface Craft (USV), which can tow the same towed synthetic aperture sonar (SAS) fitted to the Bedoks. These USVs can be controlled from ashore, or from a support ship. Singapore is acutely focussed upon the real threat of a mining incident in the Malacca Straits and approaches.

The mainstay of the USN’s MCM capability remains the 11 Avenger Class MCMVs and the Airborne MCM vested in some 29 MH-53E Sea Dragon helicopters towing both sweeps and sonars. It is pertinent to note that the USN has been attempting to establish an MCM capability based upon the Littoral Combat ship for over 10 years and has yet to reach an acceptable level of operational capability.

The USN is employing a range of MCM mission modules from the LCS which include the AN/AQS-20A mine hunting sonar; AN/ASQ-235 Airborne Mine Neutralization System; Airborne Laser Mine Detection System; AN/DVS-1 Coastal Battlefield Reconnaissance and Analysis; Unmanned Influence Sweep System; Knifefish unmanned underwater vehicle (UUV); and Barracuda mine neutralization system. It is expected that some 15 LCS platforms will be MCM-capable with the modules listed above. How often they will be able to exercise and remain proficient with these modules is unclear as the LCS class has Anti-Submarine and Anti-Surface roles as well.
We can see that a number of world navies are pursuing autonomous solutions for MCM - with good reason. The imaging sonars with Chirp and Synthetic Aperture arrays along with other sensors (such as laser line scan and lowlight cameras for object identification) carried in AUVs or towed by USVs are impressive. The physics of sound in water mean that higher frequency (greater image resolution but less range) can be used in autonomous vehicles, which can approach closer to objects on the sea floor or suspended in mid water with relative impunity. This is a clear advantage over an MCMV like the HUON Class, which must stand off at a distance to keep the crew safe, to classify and then attempt to identify an object with a remotely operated submersible.

Autonomous systems have shortcomings, which are often glossed over by their proponents. As discussed last issue, one such shortcoming is the lengthy time that autonomous systems take to transit to an area of operations (even when launched from support ships), conduct a search, transit back, have sonar records reviewed (Post Mission Analysis) and then have decisions made about what has been seen and what to do next. A flat sandy bottom presenting crisp sonar images to an AUV might make this seem like a walk in the park – such as for Exercise Autonomous Warrior at Jervis Bay - but try this again with a highly cluttered, rock strewn harbour entrance with large tracts of thick mud where every rock looks like a mine or where mines may be buried within high tidal streams. The problem and the timeline expand exponentially. Another weakness is that AUVs are easily countered with monofilament fishing nets, which potential adversaries have an abundance of and the necessary assets to lay them. Additionally, due to their inability to withstand low levels of underwater shock, AUVs are a candidate to be targeted by mine sensors looking for sonar frequencies they often use.

The German Navy, while recognising the benefits of AUVs, also understands some of the shortcomings. Their approach of deploying them from dedicated MCMVs demonstrates a more balanced strategy. The ship can operate within a minefield and deploy AUVs to increase search rates. The transit times for the AUV are reduced and the MCMV can benefit in most circumstances by using its own sonar to relocate previously detected minelike objects found by the AUVs and prosecute them with its onboard mine disposal systems. This reduced action timeline lends to overall faster clearance rates. The operational requirements of their new class of MCMVs reflect the efficacy of this approach.

In comparison, the approach now being taken by the RAN appears to lack rigour and analysis. Anecdotally, minimal modelling or analysis has been completed on what can be achieved by the proposed SEA 1905 platforms. The autonomous system itself has not been decided so this is not surprising. But the question must be asked: on what basis has the decision to proceed down this course so far, been made? The manning requirements alone have not been adequately addressed. Autonomous does not mean less people - in many cases it means more. To operate 4 – 5 AUVs alone around the clock for 7 days would take a team of 20-25 personnel (inclusive of preparation, launch and recovery, post mission analysis, and redeployment) and does not included logistic support personnel. To then operate on top of these activities, minesweeping drones, MCM Support boats with Sea Fox mine destructors, would require a team of exponential size. Their capacity to operate for an extended period would seem to be problematic without substantial back up and support, unlikely to be available in the SEA 1905 platform. In the late 90’s the RAN MCM Force operated an extensive Forward Support Unit regime which during a major port clearance would take some 20-25 ISO containers with equipment, maintenance modules, ILS units, C2 systems, analysis modules, equipment modules and logistic support - along with some 120 personnel. The equipment, knowledge and skill sets no longer exist in the RAN. So, the question remains, what sort of MCM effort can a SEA 1905 Platform bring to bear and for how long? Against this background we have emerging worldwide a range of new MCM techniques employing autonomous technologies. These developments remain incremental and there is a strong base of proven MCM capabilities supporting them. Nowhere is there a leap of faith being made of the likes that the RAN is planning in the next 5 years.

THE NEED FOR A MAJOR REVIEW OF MCM REQUIREMENTS

The last serious review of Australia’s MCM requirements was undertaken during the 1991 Force Structure Review as a result of the substantial criticism levelled at Government and the RAN by the Joint Committee on Foreign Affairs, Defence and Trade a year or so earlier. Australia, we were reminded, relied upon seaborne trade for 97% of all exports and was critically vulnerable to a mining attack on any of our critical ports and approaches. The government of the day moved quickly to allocate $1.5 billion to acquire a new class of MCMVs - and the HUON Class were brought into service just 8 years later in 1999 (an extraordinary success story by today’s Defence project management standards). Move forward to 2020 and the question that needs to be asked is: ‘What has changed so
dramatically in our strategic circumstances for our Government and Navy to allow our MCM forces to become so depleted”. Indeed, with further development of our offshore resources, particularly liquefied gas, our reliance upon seaborne export trade has increased.

THE CASE FOR RETAINING THE HUON CLASS

Notwithstanding the need for a comprehensive review of Australia’s mine warfare needs (both Mine Countermeasures and Mining), now is not the time to throw out the baby with the bathwater. The Huon class is the only thing that stands between a mining incident and the shutdown of Australia’s ports and trade. Already the reprehensible loss of two of the class has occurred against the backdrop of an increasing regional mine threat. The early retirement of the remaining four would be a debacle.

There are a number of reasons for keeping the Huons in service for the foreseeable future, not the least of which is the sheer size of the task of keeping Australia’s priority ports and approaches along our east, west and north coasts and their approaches free of mines. In the event of a mining incident Australia will need to employ enough MCM assets concurrently to keep a number of these ports open. Australia would also most probably be required to contribute to mine clearance operations on important transit routes and choke points to our north, particularly, those in the Indonesian Archipelago and the Malacca Straits through which vital fuel supplies and other essential trade items are shipped. The Huons can operate in challenging conditions that are typical of our northern priority ports with their Remotely Operated Mine disposal vehicles and divers. They are also best placed to tackle buried mines and high tidal streams by conducting vital influence mine sweeping operations. If required, in a situation where a port or approach is mined for example, the MHC’s are capable of leading ships out - for example, to enable RAN Fleet Units to exit a base which has been mined. This is a feature not yet available or practiced with autonomous assets.

In the late 90’s a vision existed within the RAN MCM group and the International Policy area of the Dept of Defence, to establish a more robust MCM skillset amongst SE Asian Navies, recognising the importance of keeping the Malacca Straits free of mines during any conflict in the region. The idea was to establish a Standing MCM Force Malacca like NATO’s MCM Standing Naval Force Channel concept. This faded in the early 2000’s and has not been heard of since. Now however is the time to reinvigorate this concept.

We now reside in a region with a world power and potential adversary, who has invested significant resources in mine technologies, practices clandestine submarine laying operations and has demonstrated scant regard for the rule of law. The threat is now very real and substantial, and it is a compelling reason why the HUON Class should be retained. If such a force was to be raised under, for example, the Five Power Defence Arrangements (FPDA), UK, Australia, New Zealand, Malaysia and Singapore would be asked to provide forces.

It could be located in Singapore and become, with regular training in the region, an especially important capability. An updated Huon with autonomous systems as well as its own inherent MCM capabilities would be ideal along with other FPDA participants in tackling the difficult task of keeping the Malacca Straits open. Additionally, the RAN could deploy its Influence Sweep Systems in considerable numbers and provide the system and training to other FPDA MCMVs (the system merely needs a tow vessel). The MCM conditions in that part of the world are particularly challenging and it is unlikely autonomous systems alone will be capable of doing the job. Minesweeping and mine hunting are exactly the tasks the Huons was built for.

CONCLUSION

The RAN is on the precipice of making a very grave mistake. The introduction of Autonomous MCM systems under SEA 1778 and SEA 1905 had its genesis in requirements papers circa 2005. These clearly stated that the dedicated MCMV was an absolute necessity and indeed the basis of the RAN’s MCM capability and that autonomous systems would augment and enhance that dedicated system for the foreseeable future. The complete lack of discussion or debate about the impending loss of the Huon class is sadly, a stark reminder of the RAN’s overall apathy and doctrinal shortcomings when it comes to MCM.

A debate is raging over $50bn-$100bn for new submarines, yet less than 0.5% of that price tag would have the fleet extended out to the 2030s and available to clear the approaches to WA Sub Base to allow those highly priced Attack Class submarines - should they ever be built - to leave port in the event of a mining incident.

The most prudent course now would be to reintroduce the Life of Type Extension for the remaining HUON class MCMVs. This should be completed without delay and the requirements should encompass a hybrid of autonomous and shipborne mine countermeasure systems. This would ensure a far more balanced approach to the introduction of autonomous systems whilst also retaining the proven MCM capability so desperately needed by the RAN. It would also provide the much-needed influence minesweeping capability, lacking for some years. With minimal modification they could even be used to tow the influence sweep remotely with one ship remotely controlling the others. Their extension would also see the retention of MCM diving in the ships as a vital capability for mine exploitation.

There are emerging worldwide a range of new MCM techniques employing autonomous technologies. These developments remain incremental and there is a strong base of proven MCM capabilities supporting them. Nowhere however is there the foolhardy leap of faith being made of the likes that the RAN is planning in the next 5 years.
Network and connect with Army, the Australian Defence Force, industry and government at the premier land forces exposition for Australia and the Indo-Asia-Pacific region. **LAND FORCES 2020** will highlight defence capability and strategy and showcase platforms, equipment, support and technologies.

- Key Australian Army, Australian Defence Force, government and industry conferences and briefings
- International defence, government, industry and academic delegations
- Comprehensive industry exhibition

Don’t miss this opportunity to network and connect with key thought leaders through this established, world-class biennial exposition.

### **2018 HIGHLIGHTS**

<table>
<thead>
<tr>
<th>Total attendances</th>
<th>Companies from 26 countries</th>
<th>Australian small businesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>15,331</td>
<td>624</td>
<td>328</td>
</tr>
<tr>
<td>International Service Chiefs</td>
<td>Delegations from 36 countries</td>
<td>Conferences and symposia</td>
</tr>
<tr>
<td>31</td>
<td>74</td>
<td>21</td>
</tr>
</tbody>
</table>

**Platforms - Equipment - Support - Technologies**


BRISBANE CONVENTION & EXHIBITION CENTRE, AUSTRALIA

For further information contact the **LAND FORCES 2020** Sales Team:

PO Box 4095 Geelong, Victoria 3220 Australia  
T: + 61 (0) 3 5282 0500  
E: expo@amda.com.au
Throughout each and every year the Australian and New Zealand defence forces have personnel and platform assets standing by on short notice to respond rapidly to Government requests for assistance either domestically or internationally. In the past few months Australian floods and particularly bushfires have involved military support. Now it is the ongoing COVID-19 pandemic.

The tropical cyclone season in the southwest Pacific, commonly called ‘The Wet’, typically runs from November to March but this year a late cyclone arrived in early April. Category 5 Tropical Cyclone Harold created a path of destruction while crossing the Solomon Islands (April 3), Vanuatu (April 6), Fiji (April 7) and Tonga (April 8) before blowing out over open seas.

An RAAF AP-3C Orion maritime patrol aircraft was repositioned to the Solomon Islands and undertook early imagery reconnaissance flights there.

On April 8 an RNZAF P-3K2 Orion aircraft was sent to fly over Vanuatu on a surveillance mission, before continuing on to survey the serious damage to Fiji and Tonga, to help each government of these three countries assess the location and level of damage, and determine how to respond to the disaster.

On the morning of April 9 at RAAF Base Amberley, an RAAF C-17A Globemaster heavy transport aircraft was prepared and loaded with stores from the Department of Foreign Affairs and Trade by air movements personnel from No. 23 Squadron. Next day it departed for Vanuatu with its load of relief supplies.

When that C-17A arrived overhead Port Vila airport after a 2,000 km 3 hour flight, the aircraft was unable to land safely. Another aircraft, an A320 flight from China chartered by Civil Engineering Construction Corp, which has a significant presence in the region, was on the runway. According to that company’s website, the Chinese plane carried 4.3 tonnes of medical supplies, including ventilators, masks and testing kits, to help Vanuatu prepare for any outbreak of COVID-19. The shipment included equipment provided by the Chinese government, some procured by the Vanuatu government and some donated from...
Guangdong Province.

The Chinese A320 was running late in unloading its humanitarian cargo at one end of the runway. Despite the control tower giving the circling RAAF C-17A clearance to land, its Captain decided he would not risk trying to land safely in the remaining 2000 metres. So, the C-17A turned back and returned to RAAF Base Amberley.

This same RAAF plane again flew to Port Vila airport on Monday 13 April, uneventfully delivering relief supplies including shelter kits, blankets and solar lanterns, as part of a four million dollar Australian package.

A second C-17A flight on April 18 unloaded hygiene kits, blankets, sleeping mats, shelter kits, insect nets, water storage buckets, water purification tablets, urgent medical supplies, kitchen kits and generators. In addition to Australian funded supplies, the C-17A also carried vital humanitarian supplies from the United Kingdom Government as well as Oxfam, Australian Red Cross, Care International, UNICEF and World Vision.

The first relief mission to Vanuatu by an RNZAF Hercules on April 12 delivered water cans, chainsaw kits, agricultural tool kits and some satellite phones, while also on board was a privately owned Robinson R66 helicopter to be used in the relief efforts. Some NZ citizens were brought home by the return flight. A second flight on April 19 unloaded 2,500 tarpaulins, 50 shelter kits and 150 family kits at Port Vila airport.

Meanwhile, April 18 saw the first flight by an RNZAF Hercules to Nadi airport, Fiji delivering tarpaulins, water containers, diesel generators, chainsaws, satellite phones and family hygiene supplies to assist with relief efforts. A second RNZAF Hercules flight on April 22 brought more relief supplies to Fiji including another 2000 tarpaulins, 94 water containers, five diesel generators, 10 chainsaw packs, satellite phones and 550 packs of hygiene products for families such as soap and sanitary items as part of New Zealand’s support.

NZ citizens who had been unable to get home on commercial flights because of the COVID-19 restrictions, returned on this second Hercules flight, after being tested then accompanied on the flight by an NZDF medical team.

This practical and highly professional emergency help by Australian and New Zealand Air Forces, as well as cash donations from both Governments for relief purposes, continues building stronger bonds with our Pacific Islands family.

The first relief mission to Vanuatu by an RNZAF Hercules on April 12 delivered water cans, chainsaw kits, agricultural tool kits and some satellite phones, while also on board was a privately owned Robinson R66 helicopter to be used in the relief efforts.
SUBSCRIBE NOW!
PRINT SUBSCRIPTION ALSO INCLUDES DIGITAL MAGAZINE

☐ Yes!
please enter my subscription to Asia Pacific Defence Reporter:

☐ Australia          □ 1 year A$198          □ 2 year A$375 (Inc postage & GST)
☐ New Zealand        □ 1 year A$224          □ 2 year A$398 (Inc airmail postage)
☐ Asia-Pacific       □ 1 year US$170         □ 2 year US$298 (Inc airmail postage)
☐ Rest of World      □ 1 year US$236         □ 2 year US$430 (Inc airmail postage)
☐ India/Pakistan & Bangladesh □ 1 year US$300  □ 2 year US$577 (Inc registered post)

☐ Please charge my: ☐ Visa ☐ Mastercard

Expiry date __________________________ Signature __________________________

☐ (Or) My Cheque Payable to Ventura Media Asia Group Pty Ltd is enclosed for $

________

Rank/Title __________________________
Initials ___________________________ Family Name __________________________
Job Title __________________________ Organisation __________________________
Address __________________________
City ___________________________ State __________________________
Postcode __________________________ Country __________________________
Ph ___________________________ Fax __________________________
Email __________________________

Phone, Fax or Email Subscription to: Ventura Media Asia Pacific Pty Ltd.
PO Box 88 Miranda, NSW 1490 Australia
Phone +61 2 9526 7188 // Fax +61 2 9526 1779
Email subscriptions@venturamedia.net // ABN 76 095 476 065
Multi-Layered Asymmetric Defence Solutions
Against Aerial & Surface Swarm Threats

TYPHOON™ Mk 30c

- Combat-proven, world-class TYPHOON Family
- Next-gen C-UAS tracking algorithm
- Advanced stabilisation for superior hit probability
- Stand-alone or CMS add-on configurations

Powered by Rafael
Delivered by VRA
Sustained by Serco