AUSTRALIAN SOVEREIGN GUIDED WEAPONS ENTERPRISE

REGIONAL
HYPERSOONIC MISSILE PROJECTS

INTERVIEW
LEE GODDARD, CEO OF THE AMC

LOCAL INDUSTRY
GUIDED WEAPONS CAPABILITIES
As the world pioneer in Loitering Weapons, IAI's family of loitering missiles leverage the heritage, and solid foundation, earned in decades of research, development, testing and operational experience. Sharing the common DNA of IAI's missile engineering, system integration, mission planning and control, logistics & ergonomics - these combat proven loitering weapons are the role model of decisive weapons achieving overmatch and defeat.
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The outcome of the Federal election on May 21 means that there will be a Labor government in power, albeit with the slimmest of margins. Once again, the opinion polls were wrong. They had predicted a uniform national swing to the ALP of 3% - enough to deliver a small majority in the House of Representatives – but to the contrary, their actual national vote declined by 1.4% and many of the seats that they gained only happened with the preferences of the minor parties. The exception was Western Australia which saw massive swings to the former opposition.

The result for the Liberal Party is a heavy blow with a 6.2% swing against it, not only losing at least 15 seats but in the process quite a bit of political talent, with former Treasurer and potential leadership contender Josh Frydenberg almost certainly being replaced by an Independent. The quick summary is that many Australians wanted a change of direction but put more faith in the minor parties – particularly the Greens – than they did in Labor.

It is unlikely that there will be any meaningful changes to national security settings or the Defence budget. Historically there is not a great deal of difference between Labor and Liberal, which was made clear during the election campaign when the former government unsuccessfully tried to argue that the Opposition would be soft on China. Not only did this fail to resonate broadly, there are even some suggestions that it damaged the government with people feeling that cranking up the anti-Beijing rhetoric is not necessarily the best way of securing peaceful outcomes.

At the time of writing, Labor is still short of a majority in the House of Representatives but will still be able to form a minority government with the support of the Greens or some Independents. Strangely, some Labor figures such as Richard Marles and Chris Bowen are taking a "no negotiations" position, which shows a sad inability to read the room when it comes to understanding the electorate, which is clearly unimpressed with old style adversarial politics.

Speaking of Mr Marles, he is the current favourite to take over the Defence portfolio. For a time, he was Shadow Defence Minister and as a consequence has some knowledge of the national security domain. However, he previously distinguished himself as having something of a low energy approach and will happily take Departmental advice on just about everything rather than rock the boat and attempt reforms – which the procurement part of the organisation desperately needs with billions of dollars being wasted on various misguided acquisitions.

The best choice for Labor would be to stick with Brendan O’Connor who has performed well in recent months – particularly during the election campaign debate at the National Press Club with his counterpart Peter Dutton. O’Connor came across as thoughtful with a detailed knowledge of the portfolio – and he refused to be baited by the frankly childish insults directed at him and his colleagues. He also presented as a decent human being – something of a rare and valuable quality in Federal politics these days.

The most important shortfall that Labor needs to address is the looming crisis in submarine capability with nuclear powered vessels a distant mirage still two decades away. There are some in the Labor Party who are not keen on nuclear power because of valid reasons connected with weapons proliferation, especially if Australia’s future fleet use bomb grade highly enriched uranium. They will be quite happy to kick that particular can well down the road with more studies and discussions about the best way forward.

The country is crying out for an interim conventional submarine capability to bridge the gap between the final years of the Collins class and the eventual introduction of Virginia class SSNs, or whatever we end up with. However, this is not the position of the RAN, which frankly just can’t be bothered with the large complex task of an additional submarine acquisition and instead would rather do nothing. In this they are likely to be assisted by Mr Marles, whose instincts will be similar.

The most sensible path Australia should follow for a nuclear-powered submarine is to bring France back into the picture. French vessels now use Low Enriched Uranium reactors that – almost paradoxically – are more powerful than their HEU predecessors. It is true that they need to be refuelled every 10 years or so, but the details of how this could be managed needs to be explored with input from the USN in particular.

Defence expenditure will remain at its present level with the possibility of an increase if strategic circumstances continue to deteriorate. The Labor government is likely to need the support of Green Senators to have legislation passed but it seems unlikely that national security measures will be held hostage to different ideologies. There will be plenty of other opportunities for that sort of horse trading.

Labor have committed to a Force Posture Review and that’s entirely sensible. They also want to increase foreign aid – especially in this region – and restore the number of diplomats serving in embassies to gather intelligence and exercise a bit more soft power. Hopefully that will make it possible to avoid debacles such as the China-Solomon Islands security pact.

The new government is off to a positive start with Prime Minister Anthony Albanese and Foreign Minister Penny Wong travelling to Tokyo to attend a meeting of the Quad just hours – literally – after having been sworn in. They reported a warm reception from the other participants – particularly US President Joe Biden – particularly because of their desire to see more action to counter climate change. Senator Wong is following this up with an urgent visit to South Pacific nations.
The Australian Missile Corporation has established a collaboration of leading Australian and global companies including SMEs, academic institutions and state governments to support Australia’s guided weapons and explosive ordnance capability.
BAE SYSTEMS AUSTRALIA SECURES $50M GUIDED WEAPONS EXPORT CONTRACT

11 May 2022

BAE Systems Australia has underscored its Australian guided weapons design and manufacturing credentials by today announcing it has secured a $50 million export contract to deliver critical hardware and software sub-assemblies into the global Evolved Sea Sparrow Missile (ESSM) program.

BAE Systems and an expanded network of Australian industry partners will deliver critical sub-assemblies into Block 2 of the ESSM program under a new three-year full rate production contract with Raytheon Missiles and Defense in the United States.

The ESSM is a medium-range, surface-to-air missile developed to protect warships from advanced anti-ship cruise missiles. BAE Systems Australia is the Australian industry lead in the NATO ESSM Consortium which oversees the program of up to 12 nations including the United States, Australia, Canada and Norway.

BAE Systems Australia has been involved with the ESSM program from the commencement of the Engineering & Manufacturing Development phase in the mid 1990’s through to Full Rate Production of the Block 1 missile, continuing its support on Block 2 development commencing in 2015.

The company will deliver a range of sub-assemblies including the missile’s thrust vector controller, aerodynamic control fins, fuselage and internal structure elements, telemetry data transmitting systems as well as sophisticated pitch over autopilot algorithms.

The initial contract award covers the first three years of full rate production at a base value of more than $50 million and up to $40 million in quantity based options.

The Block 2 contract will also secure an enduring workforce of 35 engineers and technicians and establish a significant order book for future full rate production.

BAE Systems Australia continues to work with Raytheon Missiles & Defense to achieve additional Australian industry work share, including the upgrade through redesign of existing Side Looking Sub-System.

Up to 33 Australian SMEs including RUAG Australia, Ronson Gears and Astute Electronics will manufacture and supply parts into BAE Systems’ manufacturing facilities at Edinburgh Parks. These local businesses will enable the growth of a significant sovereign supply chain, providing opportunities for future design, integration and advanced manufacturing in country.

BAE Systems Australia Chief Executive, Ben Hudson, said:

“BAE Systems Australia is proud to continue its role in the ESSM program which ensures the protection of naval fleets around the world.

“This contract, alongside our Prime Contractor role on the Nulka Active Missile Decoy, continues the important work undertaken by our employees and our trusted industry partners across Australia which have been delivering guided weapons capability into domestic and export programs for decades.

“An established sovereign design and manufacturing capability and network of industry suppliers means we are ready today to extend delivery into more guided weapons programs under the Commonwealth’s Guided Weapons and Explosive Ordnance Enterprise."

SERCO AND CIVMEC PURSUE SHARED LAND 8710 VISION

9 May 2022

Combining innovation and excellence, Serco Australia and Civmec have come together to pursue their shared vision to deliver the next-generation in assured amphibious capabilities for the Australian Defence Force (ADF) under a new Joint Venture (JV) company, the Australian Maritime Alliance (AMA).

Civmec and Serco are leading an Australia-wide team in solution development and industrial mobilisation in pursuit of the LAND 8710 Phase 1A program. Over the past year, the design of the new “Obole” Littoral Manoeuvre Vessel Medium (LMV-M) has been optimised and refined to meet the needs of the ADF and now represents the next generation in amphibious capability.

Serco Defence Managing Director Clint Thomas AM, CSC, said the alliance demonstrates the importance of delivering local industry resilience, facilitating workforce and workload predictability, and providing assured supply chain access to build a trusted and sustainable Australian shipbuilding sector.

“Serco and Civmec share a vision to provide the crucial leadership that the Australian shipbuilding sector requires, signalling an industry-led strategic approach to deliver and support essential sovereign military capabilities and sustainable workshare outcomes,” Mr Thomas said.

“With Serco and Civmec’s complementary capabilities and shared community values for realising the sustained growth of Australia’s Shipbuilding Industry, our alliance is set to deliver proven benefits through uplifting Western Australian industry capabilities, matching Serco’s global shipbuilding expertise and reach with Civmec’s superlative workforce skills, proven technology and infrastructure capacity.”

As an internationally recognised shipbuilder, Serco brings fresh perspectives and a proven stable of innovative ship designs. Over the last 20 years Serco Australia’s Program Managers, Naval Architects and Engineering Specialists have supported Naval and Commonwealth maritime operations around Australia, with a proven local Supply Chain Team and demonstrated ability to support the Army in a true partnership. During this time Serco has delivered 130 vessels into Commonwealth service and trained many thousands of Bridge watchkeepers and Seaboat crew for the Royal Australian Navy.

Civmec are a leading integrated, multi-disciplinary construction and engineering services provider to the Marine & Defence, Oil & Gas, Metal & Minerals, and Infrastructure sectors, headquartered in Henderson, Western Australia. Civmec have heavily invested in building Australia’s sovereign shipbuilding and sustainment capability through the construction of a new shipbuilding and sustainment hall. The mega structure stands 18 storeys (70 metres) high and contains 20 overhead travelling cranes with a 400 tonne lift capacity in the central hall.

Civmec’s CEO Pat Tallon is excited to progress Civmec’s credentials in demonstrating a sovereign naval shipbuilding capability.

“I am proud that Civmec is evolving to be a solid option for the Commonwealth as it seeks to expand on the Sovereign shipbuilding and sustainment capability. We are committed to the charge and look forward to forging strong relationships with Serco and others that are integral to meeting the demands of the ADF,” Mr Tallon said.

“Civmec’s Henderson facility offers unmatched shipbuilding capacity to deliver for the Commonwealth’s naval shipbuilding programs and combined with our new state-of-the-art ship assembly hall, we operate the largest fabrication workshops in Australia.

“This project builds on our experience gained through the ongoing delivery of the SEA1180 Arakura Class Offshore Patrol Vessel program. The LMV-M platform will allow us to continue to demonstrate our innovative approach to shipbuilding.”

LEW GODDARD
CEO, AUSTRALIAN MISSILE CORPORATION

www.amc.com.au

SERCO AND CIVMEC ARE LEADING AN AUSTRALIAN-WIDE TEAM...
We look forward to delivering this important capability for the Australian Defence Force.

LEE GODDARD
CEO, AUSTRALIAN MISSILE CORPORATION
RAYTHEON AUSTRALIA TEAMS WITH AUSTAL AND BMT TO DELIVER THE AUSTRALIAN INDEPENDENT LITTORAL MANOEUVRE VESSEL

CANBERRA, Australia - 5 May 2022

Raytheon Australia has teamed with local defence industry leaders Austal and BMT to deliver the new Australian Independent Littoral Manoeuvre Vessel, or ILMV for the Australian Army.

Based on a proven design and carefully tailored for the Australian environment, the Australian ILMV is a world class, future ready capability and sovereign solution aligned with the Army’s new and complex littoral manoeuvre requirements.

If selected to deliver the Army’s LAND 8710-1A program, Raytheon Australia will lead the team to deliver the BMT-designed vessel, which will be built by Austal at the Henderson shipyard in Western Australia.

Michael Ward, Raytheon Australia’s managing director, said his team, in collaboration with Austal and BMT, is ready to deliver a fielded and safe littoral manoeuvre capability to the Australian Army.

“Raytheon Australia knows how complex it is to bring a ship design to life – from training to operational testing and evaluation to sea trials and certifications. Our experience has taught us that this is a complex endeavour, requiring unique expertise that we have invested in developing over the past 22 years of delivering large-scale defence projects on time and to budget,” Ward said.

“From our work to deliver the Hobart class destroyers, and our current evergreening activities on the LAND19 Phase 7B program, we have the relevant expertise, processes, tools and capacity to bring this new class of ships to life for the Australian Army. The Australian ILMV is a resilient and flexible vessel that meets Army’s requirements. It is robust and capable, and future ready with clear growth and upgrade opportunities to ensure our solution supports the Army in Motion as they respond to accelerated warfare,” he said.

“Importantly, we are ready to start work now to meet Army’s timeline and have the experience to work with them to realise the Australian ILMV’s full operational capability” Ward said.

Austal Chief Executive Officer Paddy Gregg said his highly experienced WA-based shipyard team has the capability and capacity to deliver this specific class of ships.

“Austal Chief Executive Officer Paddy Gregg said his highly experienced WA-based shipyard team has the capability and capacity to deliver this specific class of ships.

“As one of Australia’s largest shipbuilders with an acknowledged world class operation and decades of Australian Defence Force experience, we have an existing workforce that is trusted to deliver on multiple programs from our Henderson shipyard. Our unique ability to do production design in our shipyard will also minimise risk and cost to the LAND 8710-1A program,” said Gregg.

“Our team has a successful track record in delivering ships every three months and this project will be key to providing a continuous ship building program and preserving local jobs in this vital sovereign industry."

BMT Senior Business Development Manager, Trevor Dove said the vessel had been custom-made specifically for the Australian environment.

“We are thrilled to be able to offer our customised Australian Independent Littoral Manoeuvre Vessel (Australian ILMV) design, optimising stability, speed, endurance, fuel, stores and accommodation for independent and in-company operations. Our Australian ILMV is based on BMT’s existing landing craft hullform, a mature design in the running for LAND8710-1A,” Dove said.

“It is ready to be delivered, with growth margins for a future ready Army."

Dove said the vessel had been custom-made specifically for the Australian environment.

“Our partnership with Raytheon Australia and Austal brings the experience and pedigree capable of delivering a low-risk solution designed specifically for current and future Australian Army Littoral Manoeuvre requirements.”
DIRECTED ENERGY DRONE DEFENCE

- Defence against Group 1–3 (up to 600 kg) drones
- Defeats Group 1 drone swarms beyond 1 km
- Neutralises sensors on all drones at longer ranges
- Australian technology, engineering and capability

WATCH VIDEO
EOS-AUS.COM
BMT TO OFFER UPDATED ELLIDA™ MULTI-ROLE LOGISTICS SHIP FOR SEA220

AUSTRALIA, 0600 AEST, 10 MAY 2022

BMT, a leading international multi-disciplinary engineering and ship design consultancy, will offer an updated concept design from its ELLIDA™ multi-role logistics ship design family for the Royal Australian Navy’s (RAN) Joint Support Ship project, SEA2200. The ELLIDA™ family of concept designs, launched in 2019, builds on the experience of other BMT designed vessels in-service in the auxiliary market.

The modifications to the eventual RAN requirements will take advantage of the concepts having been designed with flexibility to allow them to adapt to differing customer mission requirements. This is combined with BMT’s proven track record in developing specific solutions for naval customers. The design includes a ro-ro cargo capability, cargo stores and provision to allow replenishment at sea for fuel and dry stores, with a well dock to support amphibious operations.

ELLIDA™ has the utility to transport and deliver troops, vehicles, equipment and supplies to and from anywhere in the world in support of amphibious warfare and littoral operations, offering a versatile mix of ship-to-shore offloading and logistics capabilities to allow naval operations through landing craft, boat operations, multi-spot aviation and replenishment at sea. The centre of the ship has two extensive decks with flexible space for either vehicles, containers or equipment, ensuring the vessel has the flexibility to adapt to differing mission requirements.

Primarily a logistics ship with considerable capacity to carry solid stores and flexible options for loading, transferring or unloading, ELLIDA™ has been designed to provide strategic logistic transportation of rolling cargo, vehicles, troops and freight between operational areas to deliver support to amphibious operations using landing craft and helicopters. Also designed to operate as a humanitarian disaster response vessel, the design is flexible to allow the addition of enhanced medical and/or Replenishment at Sea facilities.

Trevor Dove, Senior Business Development Manager, BMT, commented: “Auxiliary amphibious vessels provide essential logistic support to sustain troops ashore. With many navies re-evaluating amphibious warfare operations in response to modern mission requirements, it is essential that support vessels are able to keep pace with evolving requirements to ensure vital logistical and supply needs are met. Navies around the world need to be equipped with auxiliary platforms that have the flexibility to support global operations whilst maintaining the highest levels of safety and reliability, and we are confident that the ELLIDA™ family of vessels will deliver against these requirements.”

The ELLIDA™ multi-role logistics ship is the third in the family of vessels designed by BMT for the auxiliary market, complimenting the AEGIR family already in service with the Royal Fleet Auxiliary and the Royal Norwegian Navy and SALVAS concept. In developing the ELLIDA™ design, BMT applied the knowledge gleaned through the development of operational concepts against current and future doctrines of several navies. The concept is designed to be able to react to the dynamic functional requirements of military commanders in support of government policy for several different nations.

As the trusted partner for scientific and engineering-led advice, solutions, programmes and services, ELLIDA™ will be designed in Australia, drawing on BMT’s global capabilities in ship design. Operating in six states in Australia since 2005, BMT has been supporting numerous major defence projects including the Air Warfare Destroyer platform design support, Amphibious Assault Ship (LHD) operational safety case and Auxiliary Tanker Double hull design.

Commenting on BMT’s capabilities in Australia, Dove continued: “BMT is proud of the long history we have in supporting Australia’s naval capability, drawing on the extensive experience of our in-country experts to harness the knowledge we have gleaned through global ship design programmes to ensure we are delivering the best possible capabilities to the RAN, with platform designs that are fit-for-purpose and able to meet the needs of evolving mission requirements.”
VERSATILITY IS A STRATEGIC ADVANTAGE

Take no chances. The proven and versatile Airbus A330 MRTT delivers more fuel, cargo, and passengers than any other tanker, while the latest evolution delivers the same more safely and efficiently through its fully Automatic Air-to-Air Refuelling capacity, helping to ensure the world remains a beautiful place.
GUIDED WEAPONS ENTERPRISE – NOW IT’S TIME TO ACTUALLY DO SOMETHING

If there were any lingering doubts about the importance of a country having direct access to guided weapons – and lots of them – then the current conflict between Ukraine and Russia should dispel them. It is mainly due to the large numbers of smart munitions flooding in from western nations that the unprovoked and unjustified invasion of Ukraine has ground to a halt with significant loss of Russian life and materiel.

There are some estimates that the destruction of so many Russian armoured vehicles since the assault began three months ago has consumed about seven years’ worth of Javelin missile peacetime production. The same might be true of many other guided weapons: Stinger and Starstreak anti-aircraft missiles, NLAW and Panzerfaust-3 anti-tank systems, and almost certainly the air-to-ground weapons fired by Turkish-made Bayraktar TB-2 drones.

For their part the Russians might also have run out of guided weapons – but the difference is that Ukraine can be resupplied from multiple sources. Unless Moscow can somehow cobble together an arrangement with China, they will have to rely on their own industry which is likely to find it impossible to keep up with demand – particularly if western sanctions work as intended. The Russian economy is hugely dependent on energy exports and is almost completely lacking a modern IT industry – a sector critical to produce modern weapons – and once it exhausts its stocks of microprocessors and other imported components it will be struggling to build much of anything.

Defence planners have understood a similar vulnerability for Australia, hence the announcement on March 31, 2021 of the need to establish a Sovereign Guided Weapons Enterprise, confirmed on April 5 this year made up of the industry team: Lockheed Martin; Raytheon; Aurecon; the Australian Missile Corporation; and the Sovereign Missile Alliance. All of these entities have been reluctant to discuss the next steps in the process – either because they are being banned from commenting by Defence, or because they don’t know. It’s possibly both.

APDR put the following list of questions to Defence:
1. What are the next steps being taken for the enterprise to work;
2. How will responsibilities be divided between Raytheon and Lockheed Martin;
3. What are the priorities for Australian missile manufacture (air-to-air; anti-armour etc);
4. How will Defence allocate the $1 billion in funding that has been brought forward

Having had more than a year to prepare for the establishment of the Guided Weapons Enterprise, the reply was not particularly illuminating:
“Defence is working with its strategic partners, Raytheon Australia and Lockheed Martin Australia, to identify opportunities to increase the Australian Defence Force’s guided weapons inventory and improve supply chain resilience. This will include the manufacturing of missiles or critical missile components in Australia. Further decisions about manufacturing priorities and the allocation of the $1 billion in funding will be informed by this analysis.”

To be fair to the Department, this reply was prepared at a time when the dismal effects of Peter Dutton’s time as Minister were still being felt and when supplying any useful information to the Australian public through the media was regarded as an act of High Treason.

Nevertheless, some form of roadmap would have been helpful otherwise it looks as if Defence is continuing the current era pattern of announcements but with no actual substance to them. It would also have been encouraging to have felt some sense of urgency to all of this because it needs to be a high priority task in the national interest. As international events are demonstrating, crises can occur at short notice and in ways that no rational person would anticipate.
The most advanced Infantry Fighting Vehicle and Australia’s own Combat Support Vehicle, manufactured with Australian materials.

The Lynx Combat Support Vehicle (CSV) is the most sophisticated and capable armoured vehicle ever to be designed and built in Australia, and based on a version of the Lynx Infantry Fighting Vehicle (IFV).

The Lynx CSV offers significant flexibility and is a game-changer for armies to complete a range of missions while fully protected.

Soldiers can perform recovery, repair, maneuver support and support logistics using a vehicle with similarities to the existing Lynx IFV.

The commonality between the Lynx CSV and Lynx IFV provides efficiencies and ease of use for armed forces around the world. Together, the two variants expand the Lynx family of vehicles and provide options for up to 10 variants thanks to Lynx’s modular design.

More than 100 Australian organizations support Rheinmetall local operations as part of our Australian industry network, employing thousands of Australians who are growing a sovereign military vehicle industry with major export programs underway.

www.rheinmetall.com
Having experienced serious losses in manpower and equipment, the Russians have fallen back on long range shelling by artillery and the use of guided weapons, including in at least one attack, hypersonic missiles.

Why is Australia committing over $270 billion to a limited number of expensive platforms – nine frigates, eight nuclear submarines, 75 tanks, and three or more squadrons of F-35 limited range fighter aircraft? At the same time there are few if any projects developing stocks of small but highly effective offensive guided weapons.

Turning now to Australia’s defence industry, BAE Systems Australia has been heavily involved with guided weapons for a relatively long time. A company representative told APDR that:

“BAE Systems Australia (BAESA) has more than 30 years’ experience in designing, developing and manufacturing guided weapon systems for the Australian Defence Force and exporting to Australia’s allies.

“This includes our role as Prime Contractor for the Nulka Active Missile Decoy and design and production as the Australian industry lead for Raytheon’s NATO Evolved Sea Sparrow Missile (ESSM) consortium.

“Nulka is Australia’s most successful defence export, with over A$1 Billion in export sales to close allies with BAESA developing, assembling and maintaining ordnance propulsion systems, flight control systems, launch sub-systems and platform integration.

“Our work on Raytheon’s ESSM includes a range of sub-assemblies including the missile’s thrust vector controller, aerodynamic control fins, fuselage and internal structure elements, telemetry data transmitting systems as well as sophisticated pitch over autopilot algorithms. We have recently secured the contract to deliver critical hardware and software sub-assemblies into Block 2 of the ESSM program under a new three-year full rate production program.

“Our experience in Australia and our proven track record designing and manufacturing sub-assemblies for US and other Missiles such as Kongsberg’s Joint Strike Missile has led to the creation of an exceptional local and sovereign capability that can be scaled to meet the ever-increasing demand for Guided Weapons in Australia.”

SEA DOMAIN
The RGM-84 Harpoon, manufactured by Boeing, is a ship-launched, all-weather, over-the-horizon, anti-ship missile. With a range of up to 124 kilometres, it can fly at high subsonic speeds. Its low-level, sea-skimming cruise trajectory, active radar guidance and warhead design assure high survivability and effectiveness.

It is carried by The Royal Australian Navy’s (RAN’s) eight Anzac frigates and three Hobart class destroyers which are fitted with Harpoon launch tubes and a large supply of the missiles. Since 2018 the RGM-84J model Harpoon has also been able to be fired from the RAAF’s P-8A Poseidon aircraft.

The U.S. Navy, which currently operates much upgraded Harpoon missiles, is expected to outfit its new Littoral Combat Ships with the Norwegian RGM-184 Naval Strike Missile (NSM).

Former Defence Minister Peter Dutton announced on 5th April 2022 that Australia will buy the Kongsberg Naval Strike Missile (NSM) to equip the RAN’s surface combatants. This will see the NSM anti-ship missile acquired from 2024 to replace the surface-launched Harpoon missile aboard Hobart class destroyers and ANZAC class frigates in Navy service.

This almost certainly means that the forthcoming Hunter Class frigates which will start to arrive in the late 2030s will also be equipped with NSM guided weapons.

The Raytheon Standard Missile (SM2) is mounted on the RAN’s major combatants. It is a surface-to-air defence weapon with fleet area air defence and ship self defence as its primary mission. It flies at a speed greater than Mach 3 (3,578 km/h). It has also demonstrated an extended area air defence projection capability and has a secondary mission as an anti-surface ship missile.

The AGM-114N Hellfire missile is a precision air-to-ground weapon delivering multi-target capability and strike lethality. It is capable of attacking targets out to eight kilometres and reaches speeds in excess of Mach 1.

The AGM-114N variant which the Royal Australian Navy has purchased contains a Metal Augmented Charge (MAC) and is ideal for the Navy’s use from the MH-60R Seahawk helicopter in the anti-surface warfare role. The MH-60R is capable of carrying up to eight Hellfire missiles.

On 16 Sep 2021, Australian Prime Minister Scott Morrison announced that Australia will buy Tomahawk cruise missiles for the RAN’s Hobart Class destroyers. The Raytheon Tomahawk Land Attack Missile is a long-range, all-weather, jet-powered, subsonic cruise missile that is currently used by the United States Navy and Royal Navy in ship- and submarine-based land-attack operations.
LAND DOMAIN

The world’s most advanced short-range ground-based air defence (SRGBAD) system will soon enter service with the Australian Defence Force, following the successful approval of the Project LAND 19 Phase 7B program.

The selection of the Enhanced National Advanced Surface-to-Air Missile (NASAMS) will ensure significant and crucial capability to Army, as well as the project delivering hundreds of jobs. This enhanced solution will feature a number of sensor, vehicle and integration options of Australian design added to the ‘baseline’ NASAMS.

Raytheon has a contract to produce an unspecified number of NASAMS systems for use with the Australian Army. The batteries will be mounted on Hawkei protected mobility vehicles.

The Javelin Weapon System was introduced into the Australian Army to engage and destroy current and anticipated enemy armour at ranges beyond that achievable with previous shoulder-fired anti-armour systems.

The system also offers the capability to destroy slow-moving or hovering rotary wing aircraft, or fortifications. Combat arms units employ Javelin as a dismounted shoulder-fired weapon. Javelin may be fitted to vehicle platforms. Targets are engaged by locking on to their heat signature and once fired; there is no further requirement to guide the missile.

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The Javelin’s time of flight is approximately 14 seconds for 2 kilometres.

Israel’s Rafael has demonstrated a new multi-missile launcher design for its Spike NLOS (non-line of sight) missile which gives the opportunity to defeat a massed tank attack. The NLOS is a long-range variant of the Spike LR the Australian Army has acquired. This weapon has been chosen for the Boxer CRVs and also as the new infantry Long Range Direct Fire Support Weapon.

Lieutenant General Rick Burr, Chief of Army, has noted; “The Long-Range Direct Fire Support Weapon capability will enable our dismounted teams to engage armoured targets faster, at increased range, and with improved accuracy. New technology and capabilities enable Army to challenge its adversaries in complex, remote and hostile environments.

“The alignment with the Combat Reconnaissance Vehicle (Land 400 Phase 2) will also enable Army to deliver improved operational effects for the ADF in sustainment, training and maintenance.”

Australia has announced a new partnership with Lockheed Martin in the U.S. to develop precision strike missile technology capable of hitting targets at ranges of more than 400km in an effort to bolster Australia’s military capabilities. In a recent memorandum of understanding between the Australian Army and the US military, the two countries pledge to increase the lethality, range and target engagement of the missile under development.

Meanwhile thirty upgraded Saab RBS-70 (Robotsystem 70) short range air defence weapon systems are being divided between two Air Defence Batteries within Army’s 16th Regiment. The more sophisticated Bolide improved variant of this missile have now been purchased for Army.
AIR

The AIM-120 Advanced Medium-Range Air-to-Air Missile, (AMRAAM) is an American beyond-visual-range air-to-air missile capable of all-weather day-and-night operations. Designed with a 7-inch (180 mm) diameter, and employing active transmit-receive radar guidance instead of semi-active receive-only radar guidance, it has the advantage of being fire-and-forget.

The Matra-BAe AIM-132 Advanced Short-Range Air to Air Missile (ASRAAM) was originally selected during the late 1990s as the RAAF’s new Within Visual Range (WVR) AAM, originally for use on the F/A-18A+, but now out of service.

Also, on 5 April 2022 then Minister for Defence, Peter Dutton announced that Defence will accelerate the acquisition of the Joint Air-to-Surface Standoff Missile Extended Range (JASSM-ER) for the RAAF.

“With Australia’s strategic environment becoming more complex and challenging, our ADF must be able to hold potential adversary forces and infrastructure at risk from a greater distance,” Minister Dutton said. “The JASSM-ER will enable the FA-18F Super Hornet, and in future the F-35A Lightning II, to engage targets at a range of 900km.”

This announcement also confirmed that deliveries are expected to commence as soon as 2024.

An Australian-developed wing kit has transformed the range of Boeing’s GPS-guided JDAM ‘smart’ bomb verified by flight testing at Woomera. The RAAF has already ordered JDAM and Australian industry is hoping a new RAAF order will kick-start series production of the extended range version.

The wing kit is based on DSTG’s original 1980s Kerkanya glide bomb technology demonstrator. It bestows a massive increase in the range of the weapons. At Woomera two Mk82 JDAM ERs were released from RAAF Hornets flying at 20,000ft and Mach 0.7 and flew over 40km, striking their targets with an accuracy of just 1.5m.

The RAAF has taken delivery of multiple Raytheon AGM-154C Joint Stand-Off Weapon (JSOW C) for its F/A-18F Super Hornet fleet. The JSOW C is a precision guided land attack glide weapon with a range of more than 130km. Its seeker is a terminal infrared seeker slaved to an integrated GPS-inertial navigation system.

An enhanced version, the JSOW C-1, adds a datalink allowing the weapon to attack moving targets such as ships, giving the Super Hornet a stand-off maritime attack capability.

The Thales BLU-111(AUS)B/B is designed as a direct replacement for the older-generation Mk 82 500lb iron bombs. It is a new-generation air-to-ground munition manufactured by Thales Australia and has been introduced into RAAF service.

This high-explosive iron bomb was delivered to No 3 Squadron at RAAF Base Williamtown in September 2021, where it was configured by armament technicians as a GBU-12 Paveway II laser guided bomb before being loaded onto the F-35A Joint Strike Fighter for a training sortie.

The AGM-88 HARM (high-speed antiradiation missile) is a supersonic air-to-surface tactical missile designed to seek and destroy enemy radar-equipped air defense systems. The AGM-88 can detect, attack and destroy a target with minimum aircrew input. Guidance is provided through reception of signals emitted from a ground-based threat radar. It has the capability of discriminating a single target from a number of emitters in the environment.

Australia has acquired almost one hundred of these missiles for deployment with EA-18G Growler aircraft, as well as up to 40 AGM-88E Advanced Anti-Radiation Guided Missile (AARGM) tactical missiles.

IN CONCLUSION

Looking down the list of guided weapons currently in service with the ADF, or will be soon, one has to be struck by the fact that they are destined to travel at relatively high speed to distant targets.

APDR has not, to the date of this publication, yet seen evidence that Defence has been learning from the lessons coming out of the Russian invasion of Ukraine. Surely, as a minimum, they should be acquiring at least 50 Turkish-made Bayraktar TB2 drones, and hundreds of its underslung explosives, which can be deployed four at a time.

At a cost of just over a million dollars each, a huge number can be acquired for the cost of just one large platform being acquire for the future ADF’s. The TB2’s 6.5 metre length, 2.5 metre height and 12 metre wingspan create a relatively small radar cross-section and its slow cruising speed of 70-120 knots (130-220 km/h) may have bamboozled the operators of Russia’s surface-to-air missile radars in the Ukraine, which are optimised for fast jets or missiles.

With a communication range of less than 300 km and a payload capacity of 150 kg, the TB2 can remain airborne for just over 24 hours. By the same token Defence should also invest in other small guided weapons including the AeroVironment Switchblade. When launched from a tube, its spring-loaded wings flip out and it then flies to its target area, loiters briefly if necessary while it lines up its target, then crashes on to it, detonating its explosive warhead.

Video from Ukraine shows how deadly this weapon is against even hardened targets like tanks and other armoured vehicles.
The Sovereign Missile Alliance

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GUIDED WEAPONS SOVEREIGN ENTERPRISE – AIR DOMAIN

On 1 March 2021 a contract award announcement from the US Naval Air Systems Command stated that Lockheed Martin had secured a $49.3 million contract for work on the integration of its Long-Range Anti-Ship Missile (LRASM) on the Royal Australian Air Force F/A-18 E/F Super Hornets. Lockheed is expected to complete work on integrating and testing the missile on these aircraft by March 2026.

This contract award for the integration of the missiles onto RAAF aircraft follows Australia’s 200-LRASM order under a $990 million contract from July 2020. The AGM-158C LRASM is a significant upgrade from Australia’s current AGM-84 air-launched Harpoon anti-ship missile, which was introduced in the early 1980s, with a range of 124 kilometres. The LRASM has a range in excess of 370 kilometres.

At the end of March 2022, the Prime Minister announced Australia’s Sovereign Guided Weapons Enterprise. This was followed three weeks later by Lockheed Martin and Thales Australia finalising a teaming agreement that will advance the delivery of an Australian guided weapons manufacturing capability in support of the Enterprise.

The agreement will see these experienced strategic industry partners cooperate in the design, development and production of Lockheed Martin’s LRASM SL variant, with a specific focus on booster and rocket motor technologies. This guided weapon will be fired from RAAF aircraft or launched from naval vessels.

In April 2022 the U.S. Defense Department announced the successful test during the previous month of the Hypersonic Air-breathing Weapon Concept (HAWC), an aircraft-launched cruise missile. The test coincided with video of the Russian use of a hypersonic missile against a Ukrainian military target, also in March.

The successful HAWC test and other recent advances in hypersonics development suggest faster progress from here onwards. Hypersonic weapons development is very challenging. Making a rocket that can travel at five times the speed of sound but with advanced guidance and propulsion locally manufactured elements into overseas sourced main missile bodies, or should it attempt to build whole guided missiles? This may be a case of needing to walk before starting to run. The Australian participants in this Guided Weapon Sovereign Enterprise have the capabilities to manufacture sophisticated parts but will need to take time to upskill and equip themselves with suitable technology before reaching the stage of complete missile assembly.

In parallel, industry academia and Defence will have people capable of developing designs which can be built in Australia.

When the threat of open warfare is dire, and guided weapons are urgently required in quantity, there is no future in expecting coalition partners to provide large numbers of these weapons to us. Building our own capabilities is starting not a moment too soon. It is a given that the future troubled and potentially dangerous situation currently existing in the Indo-Pacific region, could break out into open warfare with very short notice.

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You take care of us, we take care of you.

All services. In-house. We offer a seamless solution for any request. Whether it’s integrating an interior or providing specialist imaging equipment. Life-cycle support or crew training.

Trust us to take care of it.
In most conceivable conflicts, the RAN will play a major role. In rough order of probability, these tasks could be: protecting Australia’s sea lines of communication, participating in coalition naval task forces and conducting amphibious operations in conjunction with the Army. For all of these, having adequate protection against airborne and subsurface threats is essential because one doesn’t deploy ships if there is a strong probability that they will be sunk.

The main form of defence against aircraft, cruise missiles and larger UAVs are missiles: SM-2 for medium range threats to a distance of about 200km – to be replaced and/or augmented by SM-6 - and Evolved Sea Sparrow Missiles (ESSM) for shorter range protection within 50km. In a high threat environment, the RAN has to plan on firing a lot of them with ships either protecting themselves, or other vessels in a task group or even commercial traffic.

Tactics and doctrine are rarely officially discussed, for obvious reasons, but the RAN probably would employ the same processes as many other navies with a shoot-shoot-look approach to incoming aerial threats. Put simply, because incoming aircraft and missiles are closing rapidly – and getting faster as technology evolves – to fire only a single protective missile and then waiting to see whether it has hit is just too risky, so one would fire two of them close together at the same target.

If the first destroys the threat, then the second missile might be wasted – but that is still an acceptable use of resources rather than betting everything on a successful first hit. If they both miss then you fire another two as fast as possible, launch your own decoys, switch on the Phalanx close in weapon system and prepare to man the lifeboats.

While missile technology is reliable, it is not infallible – especially in circumstances where an enemy is using jamming and launching decoys as well as the real thing. If a single incoming aircraft simultaneously launched four sea-skimming missiles – a not unreasonable assumption – any navy using the shoot-shoot-look approach would be launching a lot of its own SM-2s and ESSMs in a short space of time. Assuming it survives the attack, we then turn to the problem of resupply – and in the case of Australia, without the capacity to manufacture our own missiles the locker would soon be empty.

The situation regarding ESSM is complex because it is manufactured by a multi-nation consortium – of which Australia is a part – headed by the company Raytheon. For the moment, it might be necessary for Australia to just have a huge stock of them. However, for SM-2 and SM-6 the picture is potentially brighter, with the US agreeing in a rare – if not unique – decision to allow them to be manufactured here. In August 2021 the Defense & Security Cooperation Agency said:


“The Government of Australia has requested to buy defense services related to the future purchase of Standard Missile 6 Block I (SM-6) and Standard Missile 2 Block IIIC (SM-2 IIIC) missiles. These services include development; engineering, integration, and testing (E&I); obsolescence engineering activities required to ensure readiness; U.S. Government and contractor engineering/technical assistance, and related studies and analysis support; technical and logistics support services; and other related elements of program and logistical support. The total estimated value is $350 million.”

Raytheon Australia has a missile integration facility in Adelaide; we have been given legal permission to manufacture the SM-2/SM-6 family here – so why aren’t we? Perhaps we are and it’s being kept secret.

Other guided weapons of huge importance for anti-submarine warfare are lightweight torpedoes. For reasons too complex to go into here, the RAN uses two types: the MU-90 assembled in Australia by Eurotorp; and the fully imported Mk 54 from the US and made – once again – by Raytheon. Put simply: MU-90s are fired from surface ships and Mk 54s are dropped by ASW helicopters such as the MH-60R and aircraft – mainly the P-8A Poseidon.

With quite a lot of talent in Australian industry for underwater warfare, the local design and manufacture of lightweight torpedoes should be possible and needs to be a high priority if it is not already so. Another contender for local production – if money is no longer an object – should be Norwegian company Kongsberg’s surface-to-surface Naval Strike Missile, which will be the backbone of the RAN’s strike capability for the next couple of decades.

This formidable weapon, which can also be used against land targets and is designed to operate in a complex littoral environment – just look at a map of the coast of Norway – has already been selected by the USN. It can also be mounted on trucks and used for coastal defence, as Poland is doing. A manufacturing centre in the southern part of the Indo-Pacific region would not only bolster Australia’s defences but would also support US operations.
FROM AIR, LAND & SEA

NAVAL STRIKE MISSILE
JOINT STRIKE MISSILE

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GUIDED WEAPONS – LAND DOMAIN

Australia has already started Project LAND 8113 Long Range Fires, with a budget of $5 billion, which will have a major effect in creating regional anti-access/area-denial Army capabilities. Because of its urgency this should be proceeding rapidly but as yet it is not even showing on Defence’s list of Army projects!

Advocates for this project claim it will revolutionise Army’s way of war and be highly significant in any future conflict. One has only to see the effect of Russia’s long-range weapons in Ukraine to realise how important they are. Ranges of several hundred kilometres will change the potential future battlespace and dominate it.

When the land deployment of hypersonic guided weapons launch platforms is being considered, the relative immobility of these launch vehicles, when compared with maritime or air platforms, does constitute a challenge to those forces using them.

Apart from guided weapons fired by individual soldiers, land based systems are often considered to be vulnerable to counter barrage. This is because once fired, they inevitably reveal their current position. There is an appreciable amount of time between firing the guided weapon and its trajectory being identified as an incoming threat, which then initiates counter-fire or aerial attack. This means that because the opportunity exists to move the launch vehicle to different, more secure location, this has to always be considered before firing the weapon.

Loitering munitions are highly regarded by soldiers because they can often be fired from a tube which is quite comfortably carried in a backpack. News video from the Russian invasion of Ukraine has shown a number of successful attacks on tanks, other armoured vehicles, fuel tankers and other trucks carried out by small guided weapons including the AeroVironment Switchblade.

When launched from a tube, its spring-loaded wings flip out and it then flies to its target area, loiters briefly if necessary while it lines up its target, then crashes on to it, detonating its explosive warhead.

Another loitering munition is IAI’s Green Dragon which is also canister launched and several could be readily carried in an Army Hawkei protected mobility vehicle. South Korean manufacturer KAI is manufacturing these under licence from IAI.

There is no reason why the Australian Army couldn’t acquire these weapons, having them produced in this country. That is if only they recognised and acted on the value of such weapons, rather than being focused on large armoured vehicles, which make great targets for loitering munitions.

The Spike ATGM, designed by Rafael Advanced Defense Systems, soon to be built in Australia – once bureaucratic obstacles are removed - is available in man-portable, vehicle-launched, and helicopter-launched variants. This “fire-and-forget” line-of-sight anti-tank and anti-personnel guided missile also has variants available which can be directed to attack their target beyond visual range.

Another guided weapon which Australia must be considering adding to Army’s guided weapons inventory is the M142 High Mobility Artillery Rocket System (HIMARS). This is a light multiple rocket launcher mounted on a standard truck frame. The HIMARS carries six rockets or one MGM-140 ATACMS missile. Both chassis and launcher system are produced in the United States by Lockheed Martin Missiles & Fire Control in Camden, Arkansas.

Raytheon’s Lower Tier Air and Missile Defense Sensor (LTAMDS) is a modern 360-degree, multi-mission sensor with a high degree of cross-functionality, interoperability, and modularity. It is the first sensor designed specifically for operations within the U.S. Army’s Integrated Air and Missile Defense architecture and provides defence against the most advanced threats including tactical ballistic missiles, aircraft and cruise missiles.

LTAMDS has long reach sensing over 360 degrees of battlespace and the ability to detect and track high-speed manoeuvring targets and provide data to the network. Raytheon created LTAMDS to replace their existing AN/MPQ-53/65 Radar in use by the U.S. Army for the Patriot missile system. Six prototypes are being manufactured by Raytheon for testing by the end of the 2022 fiscal year.

Hypersonic guided missile developments such as China’s recent DF-ZF and Russia’s Yu-71/74 boost-glide weapons have caused the US Navy to move its carrier strike groups further back from coasts into more open waters. Both Chinese and Russian systems fly with depressed trajectories, which are very difficult to engage. A typical ICBM flies a predictable trajectory, but boost-glide and air-breathing hypersonic weapons leverage aerodynamic forces and can hold an entire region at risk.

Raytheon Technologies systems are at the cornerstone of today’s ballistic missile defences against this new generation of hypersonic missiles. They are building systems for defence against missiles whether launched from air, sea or land. They are making progress with their Glide Phase Interceptor (GPI) whose speed, ability to withstand extreme heat, with manoeuvrability will make it the first missile designed to engage this advanced threat against coalition forces.

GPI will intercept hypersonic weapons in the glide phase of flight, which occurs once a missile has re-entered Earth’s atmosphere and is manoeuvring toward its target. The initial development phase will focus on reducing technical risk, rapidly developing technology, and demonstrating the ability to intercept a hypersonic threat.

Raytheon Australia, in addition to its local highly skilled personnel and comprehensive facilities providing working venues for Enterprise teams, as an Enterprise Strategic Partner it will be able to provide linkages between Australian teams and those working for Raytheon Technology in the United States or elsewhere.
By way of background, the Solomon Islands faces some of the most difficult challenges in the Asia-Pacific. These include endemic poverty, fragile state institutions, increasing crime and ethnic violence. All of these have negatively impacted the country’s development, and while the nation is rich in natural resources such as timber, and mineral resources such as lead, zinc, nickel, and gold, it remains one of Asia’s poorest nations. Most of its citizens work in subsistence farming, fishing, and forestry. Ever since China announced its Belt and Road initiative in 2013, nations with development needs have looked to the country with the world’s second largest economy to help provide its citizens with a better standard of living. More than 140 countries have signed on to Beijing’s Belt and Road Initiative, in which China typically lends large sums of money to countries for roads, dams, railways, ports and sports facilities.

Even though, a decade in, this Belt and Road initiative has been criticised by many as stacking the deck heavily in China’s favor, it is easy to see why the Solomon Islands might seek out China as a benefactor. Indeed, the China-Solomon Islands security pact was likely instigated by China largely to protect its extant economic investment throughout the island nation. While small and poor, the Solomon Islands is not an insignificant nation in the grand geo-political scheme of things. It sits in a strategic – but politically volatile – part of the world and is near important sea routes between Asia and the rest of the world. Indeed the Solomon Islands has been at the heart of a geopolitical tug of war since it changed diplomatic recognition from Taiwan to China in 2019. This major diplomatic upheaval put a punctuation mark on Beijing’s expanding influence in a region traditionally dominated by nations such as the United States and Australia. It is readily apparent why this turn of events has caused deep concerns in both nations, especially in light of their decades-long alliance.

For many Australians this is an especially troubling turn of events, as Australia has a long-standing development partnership with the Solomon Islands. Here is how the official Australian Government Department of Foreign Affairs and Trade website put the objectives of development assistance to the Solomon Islands ($161 million in the current year):

“Australia and Solomon Islands are strong security, development and economic partners. We share similar COVID-19 response goals—to save lives and livelihoods and emerge stronger post-pandemic. Australia is Solomon Islands’ largest bilateral donor and we are re-shaping our efforts in response to COVID-19.

“Australia is partnering with Solomon Islands to implement Solomon Islands’ National Development Strategy (2016-2035). We are scaling up health systems support, improving access to services through investments in education, telecommunications and infrastructure, helping build capacity in the police force and boosting the skills of Solomon Islands’ workers to contribute to economic recovery.”

It is easy to see that, given how Canberra has made such a substantial – and long-term – effort to help the Solomon Islands, such a bolt from the blue as this China-Solomon Islands security pact has caused Australians to become not just a bit disappointed by that nation’s decision to accept China’s aid, but also alarmed by such a move by China to expand its influence in the South Pacific region.
Australia’s former Minister for International Development and the Pacific, Zed Seselja, said in a statement after meeting Solomon Islands Prime Minister Manasseh Sogavare and other ministers when word of the impending China-Solomon Islands security pact first emerged:

“We have asked Solomon Islands respectfully to consider not signing the agreement and to consult the Pacific family in the spirit of regional openness and transparency, consistent with our region’s security frameworks.”

The previous Prime Minister Scott Morrison called out China’s motivations for instigating this pact – concerns also expressed by the head of the new Government, Anthony Albanese. He noted that the China-Solomon Islands security pact showed how many nations were vulnerable to Chinese encroachment, and said: “The sort of pressure and influence that has been seeking to be exerted in our region is very real.” Morrison added that a Chinese military base on Solomon Islands would be a “red line” for Australia.

Former Deputy Prime Minister Barnaby Joyce was a bit blunter, regarding the long-term impact of the China-Solomon Islands security pact on Australia as well as the Southwestern Pacific region, saying: “We don’t want our own little Cuba off our coast. That is not what is good for this nation, not what is good for this region.”

New Zealand’s foreign minister, Nanaia Mahuta, echoed these thoughts, calling the agreement unwelcome and unnecessary and noting that:

“New Zealand has a long-term security partnership with the Solomon Islands, and I am saddened that Solomon Islands has chosen nonetheless to pursue a security agreement outside the region. While such agreements will always be the right of any sovereign country to enter into, we have made clear to both Solomon Islands and China our grave concerns at the agreement’s potential to destabilize the Pacific region’s security.”

Other observers throughout the region have voiced similar concerns over the future balance of power in the Pacific. Dr. Anna Powles, a New Zealand security academic who first circulated the China-Solomon Islands security pact, put it this way:

“The pact provides some interesting insights into how geopolitical dynamics are playing out.”

Anne-Marie Brady, a China expert at the University of Canterbury in New Zealand, called the China-Solomon Islands security a game changer, and suggested that: “The U.S. is the main target of this move, as it aims to counter U.S. containment strategy in the Indo-Pacific. But it also directly threatens the security and autonomy of the island states of the Pacific, as well as Australia and New Zealand.”

Tarcisius Kabutaulaka, an associate professor of small and poor, the Solomon Islands is not an insignificant nation in the grand geo-political scheme of things. It sits in a strategic – but politically volatile – part of the world and is near important sea routes between Asia and the rest of the world.

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Tarcisius Kabutaulaka, an associate professor of
at the University of Hawaii at Manoa, suggested that the manner and timing of the announcement are significant. Kabutaulaka opined that: “Beijing unilaterally announced the signing just ahead of the U.S. delegation’s visit to Solomon Islands. I think that is not a coincidence.”

Charles Edel, the Australia chair and a senior adviser at the Center for Strategic and International Studies, described the deal in more dire terms:

“The lesson for the rest of the world is that China is looking to rebalance the global order in its favor. And whether that means opening trade routes, establishing a military facility, or signing a security agreement, Beijing will act to benefit its own interests, to the detriment of democracy and an open and free world.

“The security deal between China and the Solomon Islands did not materialize out of thin air. China has ramped up its presence and extended its influence across the Pacific over the past decade, and as it has done so, Beijing has been on the hunt for a military base in the region, which would allow it to project power outward and further influence the politics across the Indo-Pacific region.”

To be fair, Australia has also sought to build up security infrastructure for nations in the region. In June 2021, the Australian Government announced its intent to have the Australian Defence Force fund a $175 million major upgrade for the Papua New Guinea’s naval base on Manus Island. That said, the intent of this construction project was to enhance Papua New Guinea’s maritime security efforts, not to provide a potential base for the Royal Australian Navy.

While the reaction by nations of the southwestern Pacific has been strong and unambiguous, many have awaited the reaction of Australia’s ally on the other side of the Great Ocean, the United States. It should come as no surprise that many in the U.S. Government view this China-Solomon Islands security pact as a flashpoint of tensions between China and the United States.

U.S. officials have been quick to voice substantial concerns regarding the potential implications of this pact. A spokesperson for the U.S. State Department said that: “The agreement left open the door for the deployment of China’s military forces to the Solomon Islands and set a concerning precedent for the wider Pacific Island region.”

Immediately after the China-Solomon Islands security pact was signed, a spokesperson for the U.S. National Security Council noted that: “The agreement follows a pattern of China offering shadowy, vague deals with little regional consultation in fishing, resource management, development...”
Hanwha’s new Armoured Vehicle Centre of Excellence at Avalon in Victoria will provide our ‘centre of gravity’ for the supply of equipment to the Australian Defence Force. Given Australia’s regional proximity to Korea it is Hanwha’s intent that the same facility, and the same supply chain, will generate exports into Korea and other Five Eyes Nations.

Hanwha – Investing in Australia’s industrial resilience and taking it to the world.

MILITARY BASES

Soon thereafter, Kurt Campbell, the National Security Council’s Indo-Pacific coordinator, met in Hawaii with the four-star U.S. Commander of the U.S. Indo-Pacific Command (COMINDOPACOM) as well as senior officials from Australia, New Zealand and Japan to discuss the security deal, noting that the China-Solomon Islands security pact: “posed serious risks to a free and open Indo-Pacific.”

The United States’ concerns do not stem from mere power politics and not wanting a nation that it now considers a strategic rival to advance its interests on any front. Rather, it is the strategic location of the Solomon Islands. The nation of roughly 900 islands sits astride shipping lanes connecting the markets of Asia to the United States. Nor is this an entirely new geo-strategic situation. The Solomon Islands have long been a strategic priority — as Japan showed in World War II, before the Americans dislodged its forces in the battle of Guadalcanal.

This strategic location has caused the United States (as well as its regional allies such as Australia and New Zealand), to be especially concerned that the China-Solomon Islands security pact will allow assistance and now security practices.”
Chinese naval vessels to replenish there. That could open the door to a Chinese naval base, which would significantly extend China’s military reach in the South Pacific.

Given the recent supply chain disruptions that have put a major dent in global trade – especially between Asia and the United States – it should not be too difficult to understand the concern on the part of the U.S. Government officials and knowledgeable observers. A Chinese naval base in the Solomon Islands could threaten global trade in profound ways.

As this crisis was evolving, a White House statement said that Solomon Islands Prime Minister Manasseh Sogavare reiterated to the visiting delegation led by Kurt Campbell that there would be no military base, no long-term presence, and no power projection capability under a security deal signed with China. The White House statement went on to say that if such a permanent military presence did become a reality, than the United States would have significant concerns.

It is too early to tell what the long-term implications of this China-Solomon Islands security pact will be, as well as what the full reaction will be by nations in the region – especially Australia and the United States. Given Australia’s strong ties to the Solomon Islands – especially the security pact signed by both nations in 2017 – as well as its ongoing economic and other assistance to that nation, this is likely to be a discussion that will be high on the list of issues for the Australian Parliament, the Australian Defence Force, and the Royal Australian Navy.

As to the long-term plans on the part of the United States, that is a bit more difficult to assess. When the Campbell delegation visited the Solomon Islands to try to head-off the signing of the pact (only to find that it had already been signed) it was prepared to offer a host of incentives: from reopening its embassy in the Solomon Islands, to economic development, to maritime security, to dealing with the climate crisis, to specific help to fight a wider-range of diseases such as Covid-19.

The agreement has, for some nations, threatened to degrade the security and prosperity of the greater Asia-Pacific region. Nations such as Australia, New Zealand and the United States have strenuously objected to this pact, while other regional nations not as openly opposed to the pact are likely worried about China’s geo-strategic ambitions. And for China’s part, it is unlikely that that nation is not quite ready to chalk this security pact up as a “win,” for it probably was not prepared for such a strong backlash to the pact.

From where this observer sits, there is a bit of a silver lining to all of this churn. With the exception of the longstanding ties Australia and New Zealand have to the island nations of the Southwestern Pacific, it is fair to say that this region of the world is likely one that has suffered from benign neglect from the community of nations.

Now that this development has reminded us of the importance of these strategically located islands – as well as neighboring islands such as Papua New Guinea and Vanuatu – to the trans-Pacific trade that undergirds the globalization that has lifted – and continues to lift – hundreds of millions from poverty, there is, appropriately, more worldwide attention focused on this vast region.

One can only hope that this will be a good thing, and that the world will be more proactive in helping the people of these island nations deal with some of the weighty issues – poverty, slow economic development, disease, only modest ability to protect their fisheries, and others – that still bedevil them.
AUSTRALIAN MISSILE CORPORATION CEO, LEE GODDARD, IN CONVERSATION WITH APDR EDITOR, KYM BERGMANN

Kym Bergmann: Let's start with some background about how you arrived here, including your military career.

Lee Goddard: Well Kym, we’ve spoken about some of the things I was fortunate to do in defence and in the military. I made a decision in mid 2020 to leave full-time service and continue as an active reserve officer. The main reason was that my family was in Sydney - but I also wanted to experience a different professional environment as well.

I always say that the Navy owes me nothing, and on the contrary, I owe much to it. It was a fantastic experience. I had the opportunity over the last 18 months of my military career to be exposed to the commercial world. This also included the Australian industrialist world, the entrepreneurial world, and the innovation world.

First of all, I landed of course with The Minderoo Foundation, which is Nicola and Andrew Forrest’s philanthropy organisation. That has been just a terrific experience, an impact philanthropy run like a corporate to make a difference, fast.

The Minderoo Foundation is well known in Australia now for the many challenging issues of the time they’re taking on. They aren’t just examining problems, they’re actually doing stuff - that’s typical of Andrew and Nicola Forrest.

Following that, I’ve been exposed as well to the Tattarang Investment Group, which is one of Australia’s largest private investment firms, owned by the Forrest family. It’s been an accelerated learning process for me in the commercial innovation, entrepreneurial and impact philanthropy world.

Then in May of last year, I was invited by Robert Nioa to join the Australian Missile Corporation Advisory Board. When you leave the Defence Force, you’re focused on your own values and focused on where you’re going to be able to add value. Another part of it is looking for where you’ll be valued.

For me, the Australian Missile Corporation is not only an important endeavour, but it’s actually a very exciting enterprise and very much aligned with my focus having been an end user of missile capability. I’m a believer in sovereign capability and we need to accelerate this endeavour to get more missiles sooner to the Australian Defence Force. We also need to build up our own sovereign missile supply chain.

In the first instance, this will be working primarily with overseas missile providers such as Raytheon and Lockheed Martin. It was actually a very exciting endeavour as much as a very important one.

I'll continue with Minderoo in a small supporting role, but for the last eight weeks, I’ve been more involved with the Australian Missile Corporation, initially mobilising the team ahead of the government announcement. Now that has happened, I’m formally appointed as the inaugural Chief Executive Officer of the AMC.

Kym Bergmann: Is it a coincidence that you are working with two Australian entrepreneurs? I mean, they’re really at the leading edge of people who are trying to drive Australian capability and very proud Australians both of them.

Lee Goddard: If you bear with me just how I got there the background is probably relevant. Since the age of 17 I’ve been in the Australian Defence Force. As I said, loved to be part of it, but I’m actually a bit institutionalised - or I was - and I’ve been coming from that mindset, admiring emerging technologies and how the markets have driven things and industrialists have driven things and how we mobilise to get things done.

I wanted to experience that myself personally, and I knew that, with no disrespect to Defence and the Canberra system, I needed to leave and observe the structure from the outside. What I’m doing now has lined up with my values which are very Australian. Now actually to be with two organisations led by terrific leaders in the form of Andrew Forrest and Robert Nioa is a great experience and opportunity.

So, no it’s not really a coincidence because that’s what I was searching for. Ten years ago, I was very privileged to be in the United States for almost two years as part of the US Naval War College Program. Part of it is you get to travel all around America.

It’s an American journey to actually see the United States, warts and all, and you are challenged by some things, but you’re also impressed by a lot of things. You’re looking for the essence of why America is successful.

I found it one afternoon after we’d been to Harvard in the morning, we went to the Massachusetts Institute of Technology. On the edge of MIT, there were big warehouses. It was a robotics laboratory.

In that laboratory, you had scientists, you had students, you had innovators, you had venture capital experts, you had ex-military officers, you had government all working together, failing fast and doing things. For me, it was probably one of the most exciting things I’d seen at that point in my life.

I kind of understood that was the essence of American success. And I’m not suggesting that we don’t have that in Australia. I just don’t see it the way it could be. I want to be part of something which actually drives the whole ecosystem forward. We
need to mobilise in a very sovereign way for Australia to achieve the things that we want to achieve.

Kym Bergmann: Okay now for some details. What’s the relationship between AMC and Nioa? Clearly started by Nioa, it’s a Nioa initiative and what happens now?

Lee Goddard: We are still working through that following the government announcement, and we are working closely with Defence on the details.

First of all, we’re very privileged and very excited to be selected as part of the sovereign enterprise by the government. Following an evaluation by Defence, the Australian Missile Corporation is to be one of the inaugural three enterprise partners on the panel. We are working very closely with Department of Defence, with all the key components of that. Not least being the Australian Defence Force, the end users who actually need this capability.

There are also the two strategic industry partners, Lockheed Martin and Raytheon.

It was Rob Nioa’s idea in terms of “let’s form a collaboration between as many, not just Australian, but generally companies across the globe to support the government’s announcement in March of a sovereign missile ambition for this country.”

It was a fantastic announcement. Rob Nioa and

Rob Nioa and his team at time thought this isn’t just a business opportunity, this is really important for the future of the nation.

his team at the time thought this isn’t just a business opportunity, this is really important for the future of the nation. He formed the Australian Missile Corporation primarily through a single entity and advisory board. At this point we are working through the details with Defence, but essentially AMC is separate from Nioa.

I’d say as the inaugural AMC Chief Executive Officer, to be frank, I have one shareholder, one director. And he’s a very proud Australian citizen.

Kym Bergmann: I’m not sure that I’ve seen the full list of companies that are part of AMC, but the ones that I am aware of - you’ve got some real horsepower there, including IAI from Israel who I know extremely well. They’re central to Israel’s sovereign missile capability. It’s an impressive collection of talent.

Lee Goddard: It’s a big group, Kym. It’s 320 plus companies, which we are very proud of. We communicate with them regularly and certainly posted the announcement on the 5th of April by Minister Dutton and the Department of Defence leaders at Orchard Hills outlining the structure of the guided weapons enterprise. Following recent Defence industry briefs that whole group has stayed with us.

We’re looking forward to working very closely with them, noting that we now need to work with Defence about how we best continue to mobilise that group. We will also clearly work with Lockheed Martin and Raytheon as they define what they’ll need in the future.

It’s a really diverse group as well. If you have a look at it, you could break it down in different ways: state by state, industry by industry, nationally. We have the research sector involved; the manufacturing sector; traditional defence industry and new entrants. We have medium sized companies and small SMEs. We can integrate vertically and horizontally, so it’s a really exciting group.

Kym Bergmann: Did you just have an open invitation for companies that wanted to participate? Was it as simple as that?

Lee Goddard: Absolutely. It was an open invitation and over the period really from when the Australian Missile Corporation was formed to now, we’ve grown very quickly. It’s a series of one-on-one arrangements with each of those companies. Essentially, that’s how we form the collaboration platform.

It’s more than a collaboration platform: it’s actual collaboration.

Kym Bergmann: Is it a structure where Lockheed Martin and Raytheon are on top and the three Australian entities work underneath them? Or is it some sort of matrix arrangement?

Lee Goddard: I think I’ll leave that to Defence to work through. The announcement was made just a short time ago on the 5th of April. Clearly, it’s ultimately about our strategic industry partners - Lockheed Martin and Raytheon - and us enabling and supporting them but working very closely with Defence as enterprise partners.


Lee Goddard: Absolutely. As you would expect, we are highly encouraged by words from Defence like acceleration and more missiles sooner to the end users, the Australian Defence Force. We’re excited
about the word sovereignty and excited about the fact that Lockheed Martin and Raytheon are part of the equation. Defence has given indications of actually moving in a really positive, faster direction. But we now do need to work through the detail.

Kym Bergmann: Do you have any particular candidate missiles or projects in mind? I’ve previously written about the remarkable agreement of the US State Department and Congress to approve the manufacture of SM-2 missiles in Australia. It’s pretty remarkable that they managed to get sign off on that. Are there other things that you can see being made here very quickly?

Lee Goddard: I won’t comment specifically on the SM-2, because I’m not across all of the specifics of that particular decision.

Obviously, I’ve been to sea with a lot of missiles such as SM-2 during my naval career so I’m very familiar with them at a tactical level. I’m very excited about our ability – referring to the Australian Defence Force - first of all, to receive the weapons we need when we need them, that’s the most important outcome.

Then of course there are issues of sovereignty to be worked out as we mobilise as an enterprise. On the 5th of April, when the guided weapons enterprise was actually announced, there were references to a number of systems, such as the Naval Strike Missile JASSM-ER and a range of systems. The short answer is we’re interested in all of them.

We’re interested in them for the right reasons that Defence can get them quickly to the Australian Defence Force. We’re also interested in them in terms of how our international partners provide them to us and by what mechanisms. Then we’re interested in the life of those weapons and how Australia can get the most out of them in terms of actually having them available for our defence forces for their full lifecycle.

This is from acquiring them to deploying, maintaining, sustaining, operational use - and eventually disposal. All of those components interest us. We just want to make sure we get the best weapons as quickly as possible and it’s not just about stockpiling or availability. It’s actually all the considerations that have been announced by the government and particularly through the Department of Defence to guarantee long term sovereign guided weapons capabilities.
On April 5, former Defence Minister Peter Dutton made the long-awaited announcement of the selection of strategic partners Raytheon Australia and Lockheed Martin Australia. In addition, three Australian-based companies – The Australian Missile Corporation (AMC), The Sovereign Missile Alliance (SMA) and Aurecon Advisory – will support prime contractors in implementing the yet-to-be announced plan.

What is far from clear is whether this grouping constitutes a body that will be totally responsible for Australian guided weapons production. If it is, one wonders how companies currently outside the alliance will work with it. These include the Rafael / Varley joint venture for the production of very advanced SPIKE anti-tank guided weapons (ATGW) in Australia; BAE Systems, which is doing a lot of work in hypersonics; Kongsberg, which has been selected to supply the Naval Strike Missile; and Thales, which is involved in missile, explosive ordnance and undersea warfare technologies.

Raytheon Australia and Lockheed Martin Australia need little introduction. Collectively they produce the overwhelming majority of US guided weapons, and they are both well established in Australia with large, highly skilled, local workforces. To use the jargon, they both have the capacity to reach back to their US parent companies for access to the most sensitive missile technologies – something that has almost certainly been made easier by the AUKUS agreement.

With the agreement of Washington, these two giants of US defence industry have the ability to manufacture a range of weapons in Australia – many of which we are already planning to buy. These include, but are no means limited to: SM-2/SM-6; the Long-Range Anti-Ship Missile (with the involvement of Thales); a variety of air-to-air systems; Patriot ground-to-air missiles; the HIMARS rocket artillery system and its munitions; and the Javelin ATGW made famous in Ukraine by helping defeat Russian armour. It should be noted that Raytheon opened a very large state-of-the-art missile integration facility in Adelaide in March last year.

Of the three Australian companies nominated, two of them – AMC and SMA – declined to identify their future roles in the enterprise, most likely because they are still trying to work out what those will be and don’t want to step on any toes in the meantime. All questions were referred to Defence, which in turn has only answered in generalities.

The parent organisations of both entities are characterised as being high tech, engineer-oriented, dynamically managed and 100% Australian owned, which certainly suggests that they meet the criteria of being sovereign. AMC is owned by NIOA, a family company headed by entrepreneur Robert Nioa. SMA is made up of EOS and Nova Systems.

There is an expression in French project management philosophy that roughly translates to “rather than trying to harness 1,000 mice, just get a horse.” This, in essence, is what Defence is trying to with the sovereign guided weapons enterprise – though with five industry partners in two separate categories it is not entirely clear who are the horses and who are the jockeys. It is an attempt to bring together the many disparate parts of Australian industry that individually can produce most elements of smart munitions but who collectively have not been able to find the right opportunity to do so.
When combined, these companies have the necessary skills to design, build, test and support a variety of guided weapons. All of them are continuing to grow and both EOS and Nova Systems are aggressively pursuing export opportunities. They represent the best of Australian defence industry entrepreneurial culture with managers and owners who passionately believe in the capabilities of local industry to support the ADF.

Speaking of NIOA, on May 25 the company released the following statement under the headline Time to step up to forge AUKUS defence opportunities:

Defence businesses have a once-in-a-generation chance to play an even greater role in Australia’s growing military capacity - but industry experts warn the demand signals need to start now.

Former Australian Defence Minister Christopher Pyne and international defence specialist Hon. Ellen Lord told a PwC Australia business event in Brisbane that both industry and government have to step up sooner rather than later to take advantage of the opportunities emerging from the historic AUKUS agreement.

Ms Lord, who oversaw hundreds of billions of dollars in weapons acquisitions for the United States as the Under Secretary of Defense for Acquisition and Sustainment, referenced the US industrial effort during World War II when American companies mobilised and re-tooled to create a wartime production behemoth.

“If you go back to World War II there’s a book that Arthur Herman, a colleague of mine, wrote called Freedom’s Forged about the US turning to industrial capability to build defence capability,” said Ms Lord, who sits on the advisory board of Australian-owned munitions company NIOA.

“That led to the idea that national security and economic security are incredibly tied. The key is we need to get going.

“AUKUS is the policy umbrella, so the framework is there. That’s the opportunity here in Australia right now – and the capacity is here – it comes down to how do you go and execute.”

Ms Lord said the sovereign Guided Weapons and Explosive Ordnance (GWEO) Enterprise provided the industrial springboard along with US technology sharing agreements built into the AUKUS deal.

“The GWEO Enterprise is a way to operationalise this,” she said. “Everything that has been done up until now with the enterprise is necessary but not sufficient in terms of getting the US to work more with Australia.

“Australia needs to come back to the US with a clear ask: We need these particular weapons systems, the technical data packages and we need the human capital to come over and train.

“It is about (government) being very clear with the demand signal and what the expectations are.

“And industry has to say ‘here is the art of the possible: We are willing to invest in this if you put the demand out there for it…and by the way this can create jobs’. “Now is the time to execute because Australia needs this for its national security and economic security.”

Mr Pyne, who as Defence Minister oversaw the biggest peacetime build-up of Australia’s military capability worth $200 billion, expects the incoming Commonwealth Government will “crack on” with the sovereign industrial capability priorities (SICPs).
SINGAPORE

SPEAKING TO PARLIAMENT ON 2 MARCH, DEFENCE MINISTER NG ENG HEN SAIID THE SINGAPORE ARMED FORCES (SAF) REMAIN ON TRACK TO ACQUIRE A NUMBER OF NEW ASSETS AND CAPABILITIES TO BETTER DEFEND THE COUNTRY’S LAND, WATERS, AND SKIES AND ACHIEVE THE GOAL OF FIELDING A ‘NEXT-GENERATION’ MILITARY BY 2040.

TO SUPPORT THIS ENDEAVOUR THE SOUTHEAST ASIAN CITY-STATE ANNOUNCED ON 18 FEBRUARY A DEFENCE BUDGET OF S$16.36 BILLION (US $12.14 BILLION) FOR FINANCIAL YEAR 2022/23: A RISE OF S$1 BILLION (OR 6.5%) COMPARED TO THE REVISED EXPENDITURE FOR THE PREVIOUS FINANCIAL YEAR.

AS A TRADING NATION AND AN ECONOMY THAT IS HEAVILY RELIANT ON OPEN SEA LINES OF COMMUNICATION (SLOCs), THE SAFETY AND SECURITY OF THE MARITIME COMMONS IS OF FOREMOST IMPORTANCE FOR SINGAPORE, WHICH IS WHY THE COUNTRY IS INVESTING HEAVILY IN ITS FIRST LINE OF DEFENCE: THE NAVY.

WHILE RELATIVELY SMALL, THE REPUBLIC OF SINGAPORE NAVY (RSN) IS A WELL-EQUIPPED FORCE FEATURING A VARIETY OF ASSETS. THESE INCLUDE CORVETTES, FRIGATES, SUBMARINES, LANDING SHIPS, PATROL AND CIVIL RESOURCE VESSELS, SHORE-BASED SENSORS, AS WELL AS NAVAL HELICOPTERS AND MARITIME PATROL AIRCRAFT – THAT MAKE IT ONE OF THE MOST TECHNOLOGICALLY ADVANCED NAVIES IN SOUTHEAST ASIA.

MOSTLY FOCUSED ON ANTI-PIRACY AND ANTI-TERRORISM OPERATIONS, PARTICULARLY AROUND THE BUSY WATERS OF THE MALACCA AND SINGAPORE STRAITS, THE RSN OPERATES MAJOR BASES IN TUAS AND CHANGI – LOCATED IN THE FAR WEST AND EAST OF THE ISLAND – THAT GIVE IT DIRECT ACCESS TO SLOCs IN THESE STRATEGICALLY IMPORTANT STRAITS AS WELL AS TO THE SOUTH CHINA SEA.

REPUBLIC OF SINGAPORE NAVY SHIP RSS VALOUR MOVES INTO STATION AFT OF HMAS CANBERRA DURING EXERCISE BERSAMA GOLD 21. CREDIT: COA / LEO BAUMGARTNER

AS SINGAPORE’S MILITARY TAKE STEPS TO TRANSFORM ITSELF INTO A NEXT-GENERATION FIGHTING FORCE, ITS NAVY IS BANKING ON A COMBINATION OF ADVANCED SURFACE AND SUBSURFACE VESSELS, UNMANNED SYSTEMS, AND INCREASED REGIONAL DEFENCE CO-OPERATION TO TACKLE NEW AND INCREASINGLY COMPLEX SECURITY CHALLENGES.
The LMVs are also better armed than the Fearless-class patrol vessels they replaced, featuring MBDA’s MICA anti-air/anti-missile system, as well as 76 mm, 25 mm, and 12.7 mm guns. They also field advanced radars, sensors and other systems for enhanced situational awareness and can operate a helicopter or a rotary-wing unmanned aerial vehicle (UAV) from their aft deck.

DEFENCE-INDUSTRIAL CAPABILITIES

According to MINDEF, the concept of ‘design for support’ was incorporated into these vessels. For example, the mast of each LMV is designed to house the ship’s sensors internally to shield them from the harsh maritime environment and provide easier access for maintenance. This design change alone has halved the workload for maintenance compared to the Fearless-class vessels, enabling the more capable LMVs to be manned with a leaner crew of just 23.

Perhaps just as important is the fact that these mission-flexible vessels were designed and built locally by ST Engineering, a testament to the city-state’s defence-industrial capabilities.

To highlight its growing defence-industrial capabilities Singapore put some of its latest naval/maritime technologies on display during the 2022 Singapore Airshow exhibition. For instance, defence prime ST Engineering revealed that it has developed a new system designed to quickly convert any small, manned surface vessel into an unmanned platform.

Displayed as a scale model, the Venus.AI Autonomast is equipped with several enabling technologies such as a cyber-secure datalink, autopilot, a multi-perception system featuring a combination of navigational radar and day/night camera arrays, and a collision detection and collision avoidance (CDCA) system compliant with the Convention on the International Regulations for Preventing Collisions at Sea.

MORE UNMANNED, AUTOMATED SYSTEMS

Moreover, ST Engineering showcased both mine countermeasure and firefighting/search-and-rescue (SAR) variants of its Venus 16 series of unmanned surface vessels (USVs). In January 2021 the RSN made headlines when it carried out a demonstration of its unmanned MCM capabilities by deploying a K-STER expendable mine disposal system from a Venus 16 USV against a simulated underwater threat.

The RSN plans to replace all of its mine countermeasure vessels with fully unmanned systems from 2027.

This focus on ‘autonomous and unmanned’ points to the greater role such systems are set to play in future naval operations. In fact, the RSN is one the first few navies in the world to operate unmanned maritime systems.

In keeping with this trend, the RSN is expected to formally deploy its first tranche of locally developed Maritime Security Unmanned Surface Vessels (MARSEC USVs) later this year to enable more persistent patrolling of waters in and around the Singapore Strait.

The 30-tonne USVs can be operated either alongside manned vessels or on their own to allow larger warships to be deployed more strategically on other missions and further away from home waters.

Fitted with a CDCA system, the 16.9 m-long MARSEC USVs can autonomously navigate safely through the congested Singapore Strait, conduct round-the-clock patrols, as well as investigate and interdict suspicious vessels, according to MINDEF.

Each of these vessels has two remote operators, a stated top speed of more than 25 knots, an endurance of at least 36 hours, and is armed with a 12.7 mm stabilised weapon system with a laser dazzle.

Many of the technological trends coming out of Singapore involve flexible and versatile platforms that can carry out multiple roles and fulfil different functions. The idea is to use technology to reduce a platform’s operational and maintenance costs while increasing its availability and achieving manpower savings, particularly as Singapore struggles with low birth rates that also affect SAF troop levels.

A clear indication for this can already be found in the force’s multi-mission LMVs, and future vessels are expected to follow this trend. For instance, the RSN is set to replace its four Endurance-class landing ship tank (LST) vessels later this decade with new Joint Multi Mission Ships (JMMs) that maximise the use of automation and unmanned technologies.

MINDEF has yet to provide concrete details on the JMMs, but the ships are not only expected to be bigger than the Endurance class – with about twice the lift capacity – but also perform better as command platforms and in humanitarian assistance and disaster relief operations.

The RSN is also leveraging advanced technologies to enhance training for naval vessel maintenance. For example, ‘smart’ augmented-reality glasses are being used to allow instructors and trainees to share the same field of view in real-time and overcome space constraints.

As a trading nation and an economy that is heavily reliant on open sea lines of communication (SLOCs), the safety and security of the maritime commons is of foremost priority for Singapore, which is why the country is investing heavily on its first line of defence: the navy.
Accelerating Australia’s sovereign Guided Weapons & Explosive Ordnance capabilities
DETECT AND DETER

By fielding such a modern and capable force, Singapore has been able to bolster its deterrence posture vis-a-vis potential adversaries and send a warning that it can deal a swift and decisive retaliation blow to an aggressor and even deny the success of an offensive attack.

As Professor Liow pointed out, “Singapore has always made clear that its military exists for the purpose of deterrence and defence against potential aggressors. So, when we think about challenges the RSN may face, much of it has to do with maintaining credible defence capabilities in an age where peace and stability cannot be taken for granted.”

Among the service’s top deterrents are its six 3,200-tonne Formidable-class multirole frigates, the last two of which entered service in 2009. The anti-air, anti-surface, and anti-submarine-warfare (ASW)-capable platforms enable the RSN to operate further away from home and potentially assist allied forces, if required.

The frigates – considered the service’s most powerful surface combatants – will soon undergo a mid-life upgrade programme, with MINDEF revealing that the vessels’ combat management system will be modernised as part of the process to leverage the latest technologies such as artificial intelligence. Moreover, the warships will feature improved sensors, allowing them to detect and react faster to potential threats.

The ships’ current weapon systems will also be modernised, to be more lethal and accurate, while their communication systems will be upgraded to increase their networking capacity with the rest of the SAF. Moreover, with the incorporation of the Fleet Management System, information collected on the ships’ platform and combat systems’ health status will be collated and used for pre-emptive engineering maintenance to enhance the frigates’ operational readiness, according to MINDEF.

Meanwhile, the navy is planning to replace its six ageing Victory-class corvettes – in service since the early 1990s – with an equal number of Multi-Role Combat Vessels (MRCVs). According to MINDEF, the programme is proceeding as planned, with delivery of these MCRVs slated for completion around 2030.

The new vessels are set to feature advanced technologies such as configurable modular payloads and autonomous systems, allowing the vessel to function as a ‘mothership’ for UAVs and USVs to conduct a range of missions. This is expected to reduce the number of crew required and result in operational cost savings.

THE INVINCIBLE CLASS

That said, the greatest deterrent for any potential aggressor will arguably be the RSN’s submarine fleet. The service currently operates two modernised Archer-class and two ageing Challenger-class submarines (all of which were acquired from Sweden), and is in the process of procuring a total of four Invincible-class (Type 218SG) submarines from Germany’s ThyssenKrupp Marine Systems.

The first of the new 70 m-long Invincible-class boats is slated for delivery by mid-2022 following a six-month delay due to disruptions caused by the Covid-19 pandemic.

The conventionally powered boats, which are set to replace the Archer and Challenger submarines, are being fitted with a fuel-cell-technology-based air-independent propulsion (AIP) system that will allow them to stay submerged 50% longer than their predecessors as they navigate in Singapore’s shallow and busy tropical waters.

The new submarines – the first to be custom-built for the RSN – will also feature advanced stealth technologies, a modern combat system co-developed by ST Engineering and Germany’s Atlas Elektronik, and eight torpedo tubes.

The 2,000-tonne submarines will carry a wide range of mission payloads as well as sensors with linkages to other RSN assets and the wider SAF to enhance the vessels’ combat management system will be modernised as part of the process to leverage the latest technologies such as artificial intelligence.

That said, the force’s modernisation efforts have not been limited to new or upgraded platforms. Improvements have also been made to the RSN’s operational and command structures.

For instance, the Coastal Command was restructured in early 2009 to include the Maritime Security Task Force (MSTF) and bolster co-operation between the different agencies, services, and task forces. Moreover, in 2020 the Singapore government announced plans to restructure and modernise the MSTF to further strengthen its ability to direct and co-ordinate maritime security operations and improve its ability to address regional piracy.

Singapore’s ongoing and future naval acquisition programmes along with the the country’s growing defence industrial capabilities mean that the RSN is well positioned to remain one of the most capable and technologically advanced navies in the region. This is key as Singapore’s security, survival and success continue to be inextricably linked to the sea.

DEFENCE DIPLOMACY

At the same time Professor Liow pointed out that the service is stepping up its engagement in defence diplomacy, which has become an important feature on the regional security landscape.

“Regional militaries are starting to talk to each other more and more. This has been a positive and constructive development. So, the RSN’s role is not just about defence and deterrence, but also very much about diplomacy to foster better understanding with the navies of neighbouring states and seek out opportunities for co-operation while minimising the risk of a miscalculation,” said the analyst.
On 19 March the Russian military used a “high precision missile” in Ukraine for the first time, striking an ammunition depot in the west of the country. A video released by the Russian Ministry of Defence showed the destruction of the underground depot by what was apparently a Kh-47M2 Kinzhal (Dagger) air-launched ballistic missile. If verified, this would be the first time a hypersonic missile has been used in combat.

The Kinzhal is based on the 9K720 Iskander M short range road mobile ballistic missile. It is believed to have a top speed of Mach 10 and range of 2,000 km. The inertially-guided weapon is air-launched by MiG-31 combat jets (it is also designed for carriage on the Tu-22M3 bomber) and has been fielded since 2017.

Russia sees hypersonic weapons as a top priority and already fields two systems: the Avangard and Kinzhal. The Avangard is a nuclear-capable hypersonic glide vehicle (HGV), with a range of 6,000 km. Developed by NPO Mashinostroyenia, Avangard has a claimed top speed of Mach 27 (probably an average speed of Mach 10) and apparently can be integrated with RS-18B/UR-100UTTKh, R-36M2, and RS-28 Sarmat intercontinental ballistic missiles (ICBMs).

The Avangard was first tested in 2016 and deployed in 2019.

NPO Mashinostroyenia is also working on the 3M22 Zircon scramjet-powered cruise missile with a range of around 400-1,000 km and speeds of Mach 5, although a speed of Mach 8 has apparently been achieved in testing. The weapon was test-fired from the frigate Admiral Gorshkov from January 2020 and in October 2021 was successfully fired from the nuclear submarine Severodvinsk – service entry is expected this year or 2023. It will arm Russian cruisers, frigates and submarines.

HYPersonics coming to the Fore

Technically all ballistic missiles are hypersonic, but as they fly high into space and follow clear ballistic arcs with limited manoeuvrability, they fall into a different category. Hypersonic weapons able to reach speeds in excess of Mach 5 within the Earth’s atmosphere and manoeuvre within it are extremely difficult to intercept, let alone track, and their ability to target high-value assets like aircraft carriers makes them highly appealing to nations that can field them. Like nuclear weapons, hypersonic systems cost less to develop than a fully-fledged conventional military force, but have a massive impact.

There are three main types of hypersonic weapons: boost-glide vehicles, cruise missiles, and aero-ballistic weapons. A hypersonic aero-ballistic system is dropped from an aircraft and accelerated by rocket to hypersonic speed before following an unpowered ballistic trajectory. Boost-
Plan. The country already has over a decade of hypersonic experience, notably through the HIFiRE programme that commenced in 2007 and saw the Australian government’s Defence Science and Technology Group, the University of Queensland and the US Air Force Research Laboratory working with industry partners BAE Systems and Boeing. The most recent HIFiRE test, successfully conducted in July 2017, explored the flight dynamics of a Mach 8 hypersonic glide vehicle, while previous tests explored scramjet engine technologies.

In December 2020, HIFiRE was succeeded by the US/Australian SCiFiRE programme, which aims to develop and test a scramjet-powered hypersonic cruise missile that will ultimately enter service in the late 2020s or early 2030s. The new weapon will be a Mach 5-class precision strike missile that will be capable of being carried by fighters like the Super Hornet and F-35. Lockheed Martin, Boeing and Raytheon are involved in the project.

At the beginning of April, the United States, United Kingdom and Australia, as part of the AUKUS alliance, agreed to cooperate more closely on hypersonic weapons, as well as counter-hypersonics, and electronic warfare capabilities to push back against China and Russia’s influence in the Asia-Pacific. Three months earlier, in January, Australia opened the Australian Hypersonic Research Precinct to advance the development of hypersonic technologies.

Various entities in Australia are deeply involved in hypersonic research - BAE Systems Australia is investing in hypersonic capabilities under its Project Javelin while the University of Queensland is actively involved in the field and has the country’s fastest wind tunnel. Elsewhere, civil company Hypersonix Launch Systems and partners are developing a reusable hypersonic platform (Delta Velos). The vehicle will be powered by a SPARTAN hydrogen-fuelled scramjet engine, allowing it to reach up to Mach 12. The DART AE multi-mission hypersonic vehicle technology demonstrator is scheduled for launch in 2023.

CHINA
China is making great leaps forward in hypersonic weapon development, forcing other countries, including the United States, to keep pace. China’s military has led the world in introducing hypersonic weapons into service, demonstrating the nation’s growing expertise in missile and guided weapon technology. China has an extensive hypersonic flight research program that involves many institutes and considerable investment in facilities, including wind tunnels capable of simulating conditions in flight at up to Mach 25 – its latest wind tunnel is reportedly capable of up to Mach 30.

A notable milestone came in October 2019 when China for the first time publicly displayed its new DF-17 medium range ballistic missile system which features a DF-ZF hypersonic glide vehicle. Development began nearly ten years ago and multiple tests of the DF-17 were carried out between 2014 and late 2017. The DF-17 is comprised of a launch vehicle and HGV, but several different missiles could act as the HGV launch vehicle. The DF-17s displayed in 2019 were mounted on road-going vehicles, making them difficult to intercept prior to launch. The DF-17 can apparently reach speeds of Mach 5-10 and has a range of 1,800 to 2,500 km. It has demonstrated glide vehicles are typically launched atop a ballistic missile before gliding down to their targets at hypersonic speeds and manoeuvring along the way. Hypersonic cruise missiles are brought to hypersonic speeds with rocket boosters before being propelled by air-breathing scramjet engines, which only ignite after Mach 4. As they are air-breathing, they require smaller launch rockets, which makes them easier to launch and cheaper to build.

While ballistic missiles can typically reach targets 10,000 km away in 30-35 minutes, they have predictable signatures and flight trajectories, following clearly defined arcs. While a hypersonic weapon’s speed is not unique, its key is being able to manoeuvre - their targets remain uncertain until late in the vehicles’ trajectory. These weapons fly so fast (generally less than five minutes from launch to impact) and so low that by the time they are detected it is almost too late to shoot them down, making traditional anti-ballistic missile shields nearly obsolete.

Developing effective hypersonic weapons is not without challenges and there have been many failures along the way. One of the main issues is dealing with the extreme friction-related heat at hypersonic speeds – up to 2,200 degrees C (steel melts at around 1,400 degrees, and titanium at 1,670 degrees C). Nevertheless, advances are being made – China, for example, recently announced the development of a composite material that can withstand 3,000 degrees C, suggesting potential application in hypersonic aircraft.

It is also a challenge communicating with hypersonic weapons, especially through the plasma-laden hypersonic airflow, which can block radio waves – this also makes it very hard for sensors to sense anything, including their intended target. Other challenges are mastering even basic manoeuvres at hypersonic speeds, which induce high structural loads on the vehicle. Nevertheless, slow but steady progress is being made around the world in overcoming these issues, including in the Asia-Pacific.

AUSTRALIA
To deter China and in light of global post-COVID-19 instability, Australia plans to spend $9.3 billion (US$7.1 billion) over the next decade on hypersonic weapons development and related capabilities, including directed-energy weapons systems, under the far-reaching 2020 Defence Strategic Update and associated Force Structure Plan. The country already has over a decade of hypersonic experience, notably through the HIFiRE programme that commenced in 2007 and saw the Australian government’s Defence Science and Technology Group, the University of Queensland and the US Air Force Research Laboratory working with industry partners BAE Systems and Boeing. The most recent HIFiRE test, successfully conducted in July 2017, explored the flight dynamics of a Mach 8 hypersonic glide vehicle, while previous tests explored scramjet engine technologies.

In December 2020, HIFiRE was succeeded by the US/Australian SCiFiRE programme, which aims to develop and test a scramjet-powered hypersonic cruise missile that will ultimately enter service in the late 2020s or early 2030s. The new weapon will be a Mach 5-class precision strike missile that will be capable of being carried by fighters like the Super Hornet and F-35. Lockheed Martin, Boeing and Raytheon are involved in the project.

At the beginning of April, the United States, United Kingdom and Australia, as part of the AUKUS alliance, agreed to cooperate more closely on hypersonic weapons, as well as counter-hypersonics, and electronic warfare capabilities to push back against China and Russia’s influence in the Asia-Pacific. Three months earlier, in January, Australia opened the Australian Hypersonic Research Precinct to advance the development of hypersonic technologies.

Various entities in Australia are deeply involved in hypersonic research - BAE Systems Australia is investing in hypersonic capabilities under its Project Javelin while the University of Queensland is actively involved in the field and has the country’s fastest wind tunnel. Elsewhere, civil company Hypersonix Launch Systems and partners are developing a reusable hypersonic platform (Delta Velos). The vehicle will be powered by a SPARTAN hydrogen-fuelled scramjet engine, allowing it to reach up to Mach 12. The DART AE multi-mission hypersonic vehicle technology demonstrator is scheduled for launch in 2023.

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high accuracy and manoeuvrability during tests. China has apparently successfully tested the Starry Sky-2 (Xing Kong2) nuclear-capable hypersonic vehicle prototype. After August 2018 tests, China claimed the vehicle reached a top speed of Mach 6. A waivereder, it uses powered flight after launch and derives lift from its own shockwaves. Range is estimated at 700-800 km. It could become operational as early as 2025.

Another significant development came in July 2021 when China launched a long-range missile that went around the world before dropping off a hypersonic glide vehicle that impacted a target in China. The HGV apparently fired a separate missile mid-flight in the atmosphere.

China is also believed to be developing an air-launched hypersonic weapon – in 2020, BrahMos cruise missile, the BrahMos II is a Mach 7-capable scramjet-powered cruise missile with an intended range of 450-600 km. It was initially intended to be fielded in 2017, but has suffered from major delays and is now only expected to enter service between 2025 and 2028.

JAPAN
For several years Japan has been developing hypersonic weapons, namely the Hyper Velocity Gliding Projectile (HVGP) and the Hypersonic Cruising Missile (HCM). These will be fitted with anti-surface warheads: the ‘Sea Buster’ tandem-charge warhead and a multiple explosively formed penetrator (MEFP) warhead. They are designed to attack ships and vehicles, especially those deployed around Japan’s islands.

The Hypersonic Cruising Missile will be powered by a scramjet engine while the HVGP is designed for launch using a rocket motor with the glide vehicle separating at high altitude.

footage emerged of an H-6N strategic bomber carrying a large missile under its fuselage that appeared to be an air-launched ballistic missile. The weapon, dubbed CH-AS-X-13 by the West, has been seen on subsequent occasions. It could be related to the YJ-21/Eagle Strike 21 weapon which is a ship-launched version of the ground-based DF-21D anti-ship ballistic missile that became operational around 2010.

INDIA
Neighbouring India is another Asia-Pacific nation that has a burgeoning hypersonic weapons programme. In September 2020 the government-run Defence Research and Development Organisation (DRDO) successfully tested its Hypersonic Technology Demonstration Vehicle (HSTDV) after launch from an Angi I ballistic missile. The scramjet-powered HSTDV flew at Mach 6 for more than 20 seconds during the test. The vehicle will be used to launch both hypersonic and long-range cruise missiles. Further tests are scheduled to take place to develop the vehicle into a platform able to carry both conventional and nuclear warheads.

India is also developing the hypersonic BrahMos II missile in conjunction with Russia under the BrahMos Aerospace joint venture, formed by NPO Mashinostrojeniya and India’s DRDO. Not to be confused with the short-range, ramjet-powered BrahMos cruise missile, the BrahMos II is a Mach 7-capable scramjet-powered cruise missile with an intended range of 450-600 km. It was initially intended to be fielded in 2017, but has suffered from major delays and is now only expected to enter service between 2025 and 2028.

SOUTH KOREA
South Korea plans to develop a hypersonic cruise missile, particularly to counter apparent North Korean advances in this field. South Korea’s Defence Acquisition Program Administration earlier this year revealed it is researching hypersonic technologies in order to develop a new weapon called the Hycore. This will be launched from the ground and powered by a scramjet engine, propelling it to over Mach 6. Testing is scheduled to begin sometime in 2022; service entry would be in the late 2020s. South Korea first announced its intention to develop hypersonic weapons in August 2020 to counter threats from North Korea but for over a decade the Agency for Defence Development has been carrying out research relating to hypersonics.

NORTH KOREA
North Korea has an extensive ballistic missile arsenal – something increasingly important given its ageing conventional capabilities - and claims to have made major progress in developing hypersonic weapons. Since September 2021 it has claimed three launches, including two in January. In one of the January tests, North Korea claimed the hypersonic weapon’s glide vehicle successfully hit a target 700 km away. The most recent test apparently saw a target 1,500 km away being hit, essentially putting Japan within range. The weapon involved in the September 2021 test is apparently the Hwasong-8/Hwaseong-8 (possibly better described as a manoeuvrable re-entry vehicle than a hypersonic weapon).

North Korea’s rapid advances in missile technology are yet more clear indications that a global hypersonic weapons race is currently underway. While significant technical challenges remain in developing effective hypersonic weapons, many of these are being overcome as countries around the world push the hypersonic envelope and race to get their systems into service.
EUROPEAN MISSILES CHIEF CALLS FOR REVISED RESPONSE TO NEW THREATS

Speaking in Paris on April 6 at its Annual Results Presentation, MBDA Chief Operating Officer, Eric Beranger, gave a robust overview of the rapidly evolving new priorities facing Western defence chiefs following Russia’s invasion of Ukraine. He described the global implications of this overt act of military aggression in the heart of Europe as providing a wake-up call for nations following more than three decades of the so-called Peace Dividend.

After the Soviet Union ended, there has been general downsizing amongst the main NATO standing forces. He told his audience that a potential new world war had unexpectedly arrived “on our doorsteps” and now more than ever there was an urgent need to take measures to protect long enjoyed freedoms. “Sovereignty is not a given.” He said, “Defence is vital and while governments are customers, MBDA is a tool of sovereignty.”

He added that the company had received requests to meet new urgent operational requirements, though no details would be given at this stage as this was a matter for governments to decide. He said, “Our job is to meet new demands and adapt to meet those needs. This means mobilising supply chains and human resources. We have to avoid disruptions in supply, and do things quicker, and we also need to anticipate how events may develop over a longer period.”

The Covid emergency had demonstrated how freedom of action and freedom of decision-making had sovereign capability as a major factor in selecting what was needed, and this applies to what is provided to our forces. We must provide superior capabilities in the form of complete weapons solutions for air, sea and surface use. Industry is a key component in European sovereignty and working in close partnership with government departments such as MOD and DGA we can ensure that future weapons are making the best use of heavy investment in new technologies, such as lasers and hypersonics. In looking towards how combined programmes can follow a strategic direction, and in particular an increased European defence funding goal to fully exploit our joint capabilities, there are four axis elements – act, secure, invest and partner.

He said that across a broad range of existing missile programs there was good progress on keeping performance ahead of potential adversaries. This was seen in all domains from the successful integration program of Meteor and SPEAR-3 on the F-35 combat aircraft that were now operating in Europe and across the world.

Naval updates to Aster-30 were also keeping this very important naval missile at the forefront of fleet defences. Cooperation on new programs such as FCASW and Tempest, and new land missile systems were defining future concepts beyond line-of-sight products. Anti-hypersonic, anti-cruise and anti-ballistic missile solutions were also areas where attention was in high focus.

Europe must be able to defend itself with the freedom to decide actions that needed to be taken, he said, highlighted the major U-turn by the German government in deciding to radically increase its defence spending. “They decided to increase their spending by 100 billion Euros overnight!”

After decades where their annual defence budgets, as a percentage of GDP, were well under the NATO target of 2%, they are now promising to play a bigger part in contributing to collective European defence.

“Defence has to play its role in environmental and social compliance with strict rules, but we shouldn’t be hampered by ideological constraints.”

He added, “We must have both sustainability and security. So where are we now? This is a turning point and clearly Germany and the EU need to invest more in defence. There are two important decisions needed.

“First, how to spend the new defence money. This must be in defence capabilities. European autonomy requires more money to be spent in Europe, and a contrary view would be destructive. The engine to construct more European progress is to fund new programmes. Secondly, we need to develop new technologies. We must not drop the ball but need to provide our forces with capabilities that come from producing war-winning weapons.”

He summarised his overview by saying: “We have urgent requirements to meet. We must organise the capacity to face up to a new world post the Peace Dividend era. We have to agree the scenarios we may face and confirm the necessary architectures and supply chains. We must keep our focus on the right level of technologies that will deliver superiority in the battlefield. And we must adapt to meet these new needs.”

His final statement referred to MBDA’s financial performance for the 2020-2021 year. Revenues remained high at 4.2 billion Euros. Turnover was 5.1 billion Euros and the order book stood at 17.8 billion Euros. He said these results were in line with forecasts, and despite the difficult backdrop to the last two years major order uptakes had taken place and the company was well placed for the increase in defence spending over the coming years.

During a robust Question and Answer session,
when asked what lessons were emerging from the Ukraine situation, he said that it was too early for conclusions to be drawn but it had confirmed that if faced by a high intensity conflict the choice was not high technology vs mass. The solution required both elements. He said high technology threats required high technology solutions, but we have no other choice.

Answering a question about any roadmap to fill technology gaps, and the role of Artificial Intelligence in new weapons developments, he said, “We have to look at all domains. We are looking at effectors - these might be decoys, jammers or explosives - all must work together in a synchronised attack against defended targets. Some may require elements of AI.” He added, “New money will be needed as EU tools in decision-making.”

The subject of loitering weapons was raised and Mr Beranger said that there was a new need to consider how we might adapt technologies to what has been happening:

“This is a topic we are considering. Choices are having to be made when we look at battlefield engagement.”

Regarding the need to defend ships against supersonic missiles he pointed out that Aster had recently been tested against sea-skimming anti-ship missiles. The navies of the UK, France and Italy had participated and it achieved 100% kills, demonstrating its formidable shield capability within NATO.

On directed energy weapons, MBDA was active developing laser effectors in three categories - lower power for countering drones, medium 100kw power for various land and naval applications and hyper-power beyond 100kw for other tasks. Dragonfly was in this category and was being developed by the UK MOD with involvement with QinetiQ and other partners.

He said work was underway on understanding how best to incapacitate the target and tests include looking at how to characterise the effect on different target materials. Asked about problems in the supply chain, he said that the Covid crisis had caused major disruptions - but companies were becoming more resilient. A new challenge now is how to anticipate future shortages – like knowing what type of supply shortage spike to prepare for.

In conclusion he said that the current conflict had brought forward greater pressure on delivering superior capabilities and messages sent to adversaries must reflect a joint combined partnership effort throughout NATO. New sophisticated programs required high level investment and this would not be undertaken by governments and industry unless the customer nations had the intention to stay ahead and deploy new generation subsonic and supersonic weapons.

This revised defence planning needed to extend to such capabilities as space-based early warning to inform of missile threats as well as weapons that will cost an aggressor too much to contemplate.

There was a noticeable upbeat theme to this presentation, as might be expected with the surge in aggressive actions from Russia in Europe and potential aggression by China in the Asia Pacific region, expanding into a global neo-colonial presence through its Belt and Road policy which includes both new harbour and airfield facilities from the Caribbean to Africa, Latin America, the Indian Ocean and Pacific.

MBDA is determined to strengthen its missile product range, and improve its competitive position in the face of strong US competition, but is also very mindful of the need to develop close international partnerships that provide enhanced national sovereignty for participants. Increased sovereignty, advanced new technologies, superior capabilities, strengthened supply chains, and robust production capacity – it’s all a very big ask, but MBDA says it has identified where it needs to go in a very unstable world.
To add to this volatile mix, the North appears to be in the grip of a major Covid outbreak – and since the entire population of 26 million appears to be unvaccinated, the outcomes are unpredictable with worst case scenarios pointing to a complete collapse of the economy. If this happens the consequences for internal stability – or rather an absence of it – could be drastic.

In addition, the US has indicated that it plans to restart major military exercises with the RoK – often seen by the North as an outrageous military provocation. Since these often involve large numbers of ships from the USN including an aircraft carrier with nuclear weapons operating close to territorial waters and rehearsing amphibious assaults, it is little surprise that Pyongyang reacts belligerently to these events.

On 25 March, North Korea announced the successful test of its longest-range strategic weapon to date. The launch of the Hwasong-17 intercontinental ballistic missile (ICBM), described by Pyongyang as a “reliable nuclear war deterrent”, confirmed the end of the communist regime’s five year-long, self-imposed moratorium on long-range missile testing.

Although South Korean intelligence assessed Pyongyang did not test an entirely new weapon, but rather a variant of the Hwasong-15 ICBM launched in 2017, the data published by the defence ministries in both Seoul and Tokyo pointed to this being a more capable system.

The launch was just one in a flurry of missile tests conducted by North Korea in recent years, highlighting the country’s determination to advance its nuclear weapon and missile programmes, despite UN Security Council sanctions and high-level diplomatic efforts to prevent this.

While North Korea’s growing ICBM arsenal is aimed at the US mainland, most of the weapon systems unveiled since 2019 have been designed to strike regional targets. An important reason for this appears to be Pyongyang’s growing concern about the superior conventional military capabilities of the US and regional allies Japan and South Korea.

To try and overcome this growing technological and capability gap, the country’s leader, Kim Jong-un, revealed in early 2021 that the regime had embarked on a five-year plan to modernise the Korean People’s Army (KPA), bolster its deterrence capabilities, and enable it to “fight a war at the highest level”.

Kim said at the time that his country was at different stages in the development of new military platforms and weapon systems, including – but not limited to – a nuclear-powered submarine, tactical nuclear weapons, hypersonic glide vehicles, electronic warfare equipment, intermediate-range cruise missiles with conventional warheads, and reconnaissance satellites.

In fact, some of these systems have already been tested and put on display. For instance, North Korea held a night-time military parade on 25 April showcasing, among other things, the Hwasong-17, a new ballistic missile type mounting an apparently manoeuvrable re-entry vehicle (MaRV), the Hwasong-8 – a claimed hypersonic glide vehicle –, and a submarine-launched ballistic missile (SLBM) based on the KN-23 short-range ballistic missile (SRBM). Also displayed was a possibly new and larger Pukguksong-series SLBM.

ROKS Wang Geon (DDH-978), a Republic of Korea Navy Chungmugong Yi Sun-sin-class destroyer, prepares for an underway replenishment with USNS Rappahannock (T-AO 204) in the Coral Sea, July 19, 2021, as part of Talisman Sabre 21. (Photo by Third Officer Brandon Feinberg)
According to an April report from the US Congressional Research Service (CRS), many of these advanced missile systems combine two important features: First, they are ‘dual capable’, meaning they can carry a nuclear or a conventional warhead. This is relevant for the regime as Kim is said to view nuclear weapons as “the ultimate guarantor” of his rule.

Pyongyang, which is believed to retain a stockpile of nuclear weapons, reportedly continues to produce fissile material (plutonium and highly enriched uranium) for military purposes. Moreover, the regime is believed to be capable of miniaturising a nuclear warhead for arming tactical missiles.

**PENETRATING MISSILE DEFENCES**

Second, the weapons appear to be aimed at defeating or degrading the effectiveness of missile defences deployed in the region, including the Patriot, Aegis Ballistic Missile Defense (BMD), and Terminal High Altitude Area Defense (THAAD) systems.

Furthermore, many of the new systems demonstrate a shift toward solid-fuel propulsion, satellite guidance systems, improved in-flight manoeuvrability, and a variety of mobile launch platforms. These features are meant to provide the projectiles with greater mobility and survivability as well as greater precision on target.

Examples include the road-mobile KN-25, KN-24, the KN-23 (US/South Korean designations) SRBMs, the latter of which “exemplifies the most notable advances to the North Korean inventory in the smaller category of weapons”, according to the authors of the CRS report.

The reason for this is the KN-23’s atypical flight during which it travels much closer to the ground than a traditional ballistic missile, only to conduct a ‘pull-up’ manoeuvre on terminal approach. The ability of ground-based interceptors to destroy the missile is then further complicated as the SRBM increases its speed and angle of attack while approaching its target.

The diverse capabilities of the KN-23, which resembles the 9M723 missile used by the Russian Iskander system, explains why North Korea has decided to develop several variants of this weapon for deployment on different platform types, including wheeled and tracked transporter-erector-launch vehicles as well as submarines and railway cars.

Another weapon being developed to penetrate an adversary’s air defences is the MaRV-equipped ballistic missile, the designation of which has yet to be revealed. The booster rocket used for the system appears to be the same as that deployed with the Hwasong-8, which North Korea has also described as a “hypersonic missile”.

In addition to this, Pyongyang is expected to continue SLBM development and expand its naval deterrent, as the country introduces new submarines into its navy. According to the CRS report, the progress made so far suggests “an effort to counter land-based THAAD missile defences by launching attacks from positions at sea outside THAAD’s radar field of view, although local Aegis BMD systems could likely still track these projectiles”.

**U.S. Pacific Command deployed the first elements of the Terminal High Altitude Area Defense, or THAAD, system to the Republic of Korea on March 6, 2017, implementing the U.S.-Republic of Korea Alliance’s July 2016 decision to bring the defense capability to the peninsula. (U.S. Army photo)**

**A MORE AGGRESSIVE NUCLEAR POSTURE**

Given North Korea’s limited quantity of weapons, launchers, and warheads, a key element of the country’s missile doctrine has been continued testing to develop, ensure, and demonstrate these features. North Korea releases very few details of its missile tests, meaning that little is known about the weapons’ accuracy, guidance systems, test payloads, and whether some of them would also play an anti-ship role.

Despite this, and a number of failed attempts, North Korean missile tests have demonstrated growing success and, coupled with increased operational training exercises, suggest a pattern “designed to strengthen the credibility of the country’s regional nuclear deterrent strategy”, said the authors of the CRS report.

The rapid pace of North Korea’s military modernisation, and especially its development of various strategic and tactical systems, has raised concerns in Seoul, Tokyo, and Washington that Pyongyang might use tactical nuclear weapons capable of evading regional air defences to take out time-sensitive, high-value targets in case of a conflict.

These concerns are being compounded by warnings that Pyongyang might take a more aggressive nuclear posture. In his 25 April parade speech, Kim hinted at the possibility of launching pre-emptive nuclear strikes should an adversary “try to violate the fundamental interests of our state”.

Such an approach would certainly lower the threshold for deploying nuclear weapons on the Korean Peninsula and further increase security concerns in the region.

**SOUTH KOREA BOLSTERS AIR DEFENCES**

Kim’s warning came about two weeks before a new South Korean president took office on 10 May, vowing to take a tougher stance on Pyongyang. President Yoon Seok-Youl has signalled a more confrontational approach, pledging to bolster his country’s defence alliance with Washington while strengthening South Korea’s own military capabilities to “completely deter any provocation” from the North.

In response to the growing missile threat, the new South Korean administration has vowed to further bolster the country’s missile defences, including by deploying more THAAD systems.

However, more THAAD batteries in South Korea are likely to strain Seoul’s ties with Beijing, which has repeatedly expressed strong opposition to such a move, claiming that THAAD poses a threat to China’s own security.

Given the rapid pace of KPA modernisation, South Korea has been ramping up defence spending and investing more in strengthening its air defences and developing other capabilities to counter the missile threat.

For instance, the country is set re-organise its air defence units, expand their role and capabilities, and acquire more locally developed air-defence systems such as the Cheongung Block-2 mid-range surface-to-air missile (SAM) system, which is operated by the Republic of Korea (RoKAF) alongside the US Patriot Advanced Capability-3 (PAC-3) SAM system as part of South Korea’s multi-layered air defences.

The Block-2 is a hit-to-kill missile interceptor, designed primarily to engage enemy aircraft and incoming ballistic missile targets out to a range of 40km, with a ceiling of about 20 kilometres.

Seoul is also working on the Korean Long-range Surface-to-Air Missile (L-SAM) system, development of which is due for completion in 2024. It will feature two types of interceptors – for ballistic missiles and aircraft – with the former
expected to have a range of 150km and be capable of intercepting missiles at altitudes of 40-100km, and the latter intended for use against high-flying aircraft out to ranges of 150 kilometres.

Moreover, Seoul approved in April the development of a long-range, ship-borne SAM system for deployment on the Republic of Korea Navy’s (RoKN’s) next-generation KDDX destroyers. The project, which has been provisionally budgeted at KRW690 billion (USD560 million), is expected to begin in 2023 and be completed by 2036.

The RoKN is also planning to equip the second batch of its KDX-III destroyers with SM-3 and the longer-range SM-6 BMD systems.

More recently, on 10 May, South Korea announced the successful development of radar technology capable of not only detecting but also accurately tracking ballistic missile warheads. The technology can reportedly discern between the warheads of hostile missiles and other non-explosive missile parts, such as propellant canisters and debris, generated after booster rocket separation. It can do this by measuring the length of the objects, thus preventing the waste of valuable air-defence resources.

That said, Seoul is not only relying on SAMs to improve the country’s air defences. Hanwha and other local companies are known to also be working on laser-based systems, and in early May a South Korean institute launched a research project to develop an air-defence system featuring ultra-strong, laser-plasma technologies that would be capable of neutralising missile sensors or swarms of small UAVs.

**AN ARRAY OF NEW WEAPONS**

At the same time, Seoul has been bolstering its own capabilities to take out critical targets in North Korea. For instance, the RoKN announced on 15 September 2021 its first successful test of an indigenous SLBM, becoming only the eighth country in the world to field this capability and the first non-nuclear armed country to do so.

The weapon, which was launched from KSS-III-class submarine Dosan An Chang-ho while submerged, was one of four missiles unveiled by the Ministry of National Defense (MND) in Seoul that day, with the other weapons being a ground-launched supersonic cruise missile, a ground-launched ballistic missile, and a long-range air-to-surface missile.

Referring to the latter, the MND said at the time that the weapon is meant for use by the Korea Aerospace Industries’ (KAI’s) KF-21 Boramae low-observable fighter aircraft, which is being developed for the RoK Air Force.

The new ground-launched ballistic missile – a variant of the Hyunmoo-2 – features an increased weapon payload and is expected to be capable of destroying concrete buildings and underground tunnels, both of which suggest a possible kinetic energy penetrator component to the payload.

The new supersonic cruise missile, which is intended for an anti-ship role, is said to feature a higher speed profile than existing missiles, thus making it harder to counter by enemy vessels and improving its survivability and strike efficacy.

Moreover, the country’s Agency for Defense Development (ADD) revealed in December 2021 that it is working on a technology demonstrator for a ground-launched hypersonic cruise missile project.

In addition, South Korea approved in late April a project to enhance the capabilities of the ground-launched Korean Tactical Surface to Surface Missile (KTSSM), which is currently fired from a four-round static platform. The project, due to start next year and be completed by 2034, aims to enhance system mobility and survivability by installing it on a mobile launch platform.

**ENHANCING MULTI-DOMAIN CAPABILITIES**

South Korea is also stepping up efforts to enhance its defence-related space technologies. Seoul announced in August 2021 that it would invest KRW16 trillion (US $12.5 billion) over the next decade to foster the country’s space defence industry in a number of areas, including systems, technologies, facilities, and infrastructure.

And on 30 March - just six days after Pyongyang’s Hwasong-17 ICBM launch –, Seoul revealed its first successful launch of an indigenous, solid-fuelled space rocket. The space launch vehicle is expected to eventually put small and micro-satellites into low-Earth orbit as part of efforts to enhance space-based ISR capabilities.

Development of this rocket type became possible after Washington and Seoul agreed in May 2021 to lift restrictions barring South Korea from working on solid-fuelled space rockets and fielding ballistic missiles with a range greater than 800 kilometres.

The country is also rapidly modernising ISR and electronic warfare (EW) assets as well as platforms and weaponry used in the conventional air, land, and sea domains. To increase its technological and capability edge over Pyongyang, Seoul is also developing and beginning to field a wide array of stealthy, unmanned, and autonomous systems. Another reason for this move is that South Korea is trying to reduce the number of its active military personnel as it grapples with low birth rates.

This drive, which increasingly banks on local research and development, is not only meant to ensure that the South can counter North Korea’s growing military capabilities, but also to reduce its reliance on US forces and equipment and facilitate the transfer of wartime operational control of South Korean troops from Washington to Seoul.

**FUELLING THE ARMS RACE**

Both Seoul and Pyongyang argue that the continuous development of their respective missile systems and defence technologies is meant to deter against future provocations and help overcome asymmetric threats.

However, such an approach has also been heightening tensions and fuelling a regional arms race while making a diplomatic solution increasingly difficult.
China has the most active and diverse missile development programme on the planet, with a big emphasis on ballistic and cruise missile capabilities. In addition to its many locally built cruise missiles, China also operates imported Russian weapons like the 3M80E Moskit and 3M54/3M14 Klub/Kalibr. Its cruise missile arsenal is able to attack large naval vessels like aircraft carriers, ensuring dominance of its waters—and offensive capabilities in neighbouring seas.

Evolving from the HY-4 anti-ship cruise missile (ASCM) series is the short-range turbojet-powered YJ-63/C-603 land-attack cruise missile, first tested two decades ago, with service entry around 2004. It is carried by the dedicated H-6H missile carrier, but can be carried by other H-6 bombers.

A more recent development is the CJ-10/DH-10: China's first long-range cruise missile, which debuted at a 2009 military parade. Based on Kh-55 technology, its range is 1500km+—several times that of weapons like the YJ-63. The CJ-20/KD-20 is the air-launched version, entering PLA Air Force service in the late 2000s along with the dedicated H-6M missile carrier. With a turbofan engine, it can reach 1500-2000km depending on payload, which can include nuclear/conventional warheads.

In 2019 China publicly revealed the road-mobile DF-100 supersonic cruise missile, apparently with a roughly 2000km range. The ramjet-powered weapon can be mounted on a 10x10 transporter erector launcher in pairs.

With an eye on the export market, in 2014 China’s CASC unveiled the CX-1 supersonic ASCM, which looked identical to the Russian-Indian BrahMos. This fell off the radar, and now Poly Technologies is touting its HD-1 series for export. These have a claimed Mach 3.5 top speed and 290km range. The ramjet-powered weapon can be air-launched (HD-1A) or...
CRUISE MISSILES

canister-launched (HD-1C). The HD-1C has started trials, with its test phase still underway.

China fields a large number of ASCMs, along with anti-ship ballistic missiles as part of its vast anti-ship weaponry inventory. The country started out by copying Soviet weapons such as the P-15 Termit, to produce the SY-1 and SY-2. These evolved into the HY-1/FL-1 as well as their HY-2, FL-2, SY-2 and HY-4/C-201 derivatives (ship- land- and air-launched).

After limited success with cruise missiles like the YJ-1 and HY-3, China introduced into service the vastly improved YJ-18 in 2014. Apparently derived from Russia's 3M-54E 'Klub', the YJ-18 comes in anti-ship and land attack variants. An air-breathing engine is used for cruise at Mach 0.8, with a rocket boosting it to Mach 2.5-4 for its terminal dash. The YJ-18 equips various Chinese destroyers, cruisers and submarines and is offered for export.

Another important modern ASCM is the YJ-12, which features a ramjet engine with solid rocket booster, giving an estimated Mach 2.5-3.5 cruise speed and 150-400km range. Officially revealed in 2015, it is in service with H-6 aircraft and is offered for export as the CM-302. It can be ground launched from a road-mobile vehicle as the YJ-12B.

The PLA Navy’s analogue to the Tomahawk is the YJ-62 (C-602), with a Mach 0.9 cruise speed and 280km range. It can be ship- and ground-launched. It was introduced into service in 2003 and has been exported to Pakistan and Pakistan. Equivalent to the Exocet and Harpoon is the YJ-8 (C-801) series that entered service from the late 1980s and widely exported. The air- and submarine-launched versions are the YJ-81 and YJ-82 respectively.

In the late 1990s the PLA began fielding the subsonic short range (180km) YJ-83 ASCM, carried by numerous PLA Navy and Air Force aircraft and warships. The YJ-83KH features an imaging infrared seeker and has an extended 230km range. The export version (C-802A) is in service with Pakistan and Myanmar, equipping its JF-17 fighters – it is also used by the Royal Thai Navy. It appears the YJ-83 was used as the basis for the KD-88 air-launched weapon in service with the PLA Navy Air Force.

INDIA

As part of its strategy of deterring China and Pakistan, India has been developing longer-range and more diverse missile systems, and this includes cruise missiles. The foremost of these is the Mach 2.8-capable ramjet-powered BrahMos being developed together with Russia under the BrahMos Aerospace joint venture. As such, the BrahMos draws on Russian expertise and is based on the 3M55 (P-800 Oniks)/Yakhont/Bastion. The naval and ground-launched systems entered service in 2005 while mass production of the air-launched BrahMos-A was cleared in late 2021. The lighter BrahMos NG is being developed for the Tejas aircraft.

BrahMos is available for export and in January it emerged that the Philippines had signed a contract to acquire BrahMos missiles for its shore-based Anti-Ship Missile System under a US $375 million deal. At least one land-based battery will be acquired for coastal defence.

India has also developed an indigenous cruise missile: the Nirbhay. Similar in configuration to the Tomahawk, the range of the turbojet-powered missile is 800-1000km. Flight testing began in 2013 but has proven to be problematic, with numerous malfunctions, resulting in only limited service. The weapon is expected to be deployed on several platforms in the future, including surface ships and submarines.

India is also working on a turbofan/ramjet-powered Long Range Land Attack Cruise Missile with a 2000km range. Flights are expected to begin in 2023. The Indigenous Technology Cruise Missile demonstrator is expected to contribute to the project.

JAPAN

After developing the ASM-1 and ASM-2 anti-ship missiles, Japan spent two decades developing the ramjet-powered ASM-3 for its F-2 fighter. This air-launched anti-ship missile has an estimated Mach 3 top speed and 200km range. Improved versions are expected to enter service in the coming years. Japan is also developing the Type 12 subsonic anti-ship missile – already in service – into a long-range (1,000km) cruise missile capable of ship- and aircraft-launch. This will enter service from the mid-2020s.

NORTH KOREA

North Korea is fielding a remarkably large number of missiles, including intercontinental ballistic missiles, as it seeks to use these as force multipliers for its ageing conventional forces. At least several cruise missiles have been developed, such as the Kumsong-3/KN-19, a North Korean Kh-35 ASCM variant first revealed in early 2015. In 2017, North Korea revealed a ground-based version, with a four-canister launcher fitted to a tracked vehicle.

The Kumsong-3 is likely to be far superior to the KN-01 (Kumsong-1), derived from Chinese and Soviet designs like the P-15 and HY-1/2, which North Korea previously acquired. The KN-01, with a 160km range, was first identified in the late 1990s.

In September 2021, North Korea test-fired what it said was a new long-range cruise missile that can travel around 1500km. Images showed a weapon similar in configuration to the Tomahawk but little further information has come to light. Further cruise missile tests were claimed earlier this year.

PAKISTAN

Pakistan is rapidly evolving its missile arsenal, which forms a critical component of its defence strategy, with missiles being used to counter India’s conventional military advantage. Major progress has been made with regard to cruise missiles, especially with Chinese assistance.

In response to Indian developments, from the 1990s Pakistan began developing the Babur/Hatf 3 ground-launched cruise missile. The subsonic turbofan-powered weapon was test-fired in 2005, with service entry around 2010. A conventional or nuclear payload can be carried. In late 2021 Pakistan fired the longer-range Babur-1B that can reach 900km+. Nearly double earlier models. The Babur-1A and 1B are in service with Pakistan’s ground forces as road-mobile land-attack cruise missiles. A submarine-launched version (Babur-III) is under development. The Harbah is the ship-launched version, in service with Pakistan Navy. It was first test-fired in early 2018.

Pakistan’s other indigenous cruise missile is the air-launched Ra'ad (Hatf 8). This has a roughly 350km range, although it could be up to 600km for later variants. The turbojet-powered missile has been fielded on Mirage Ilıls since 2017.
SOUTH KOREA

South Korea relies heavily on its missile capabilities to deter - and if need be respond to - North Korean aggression. Various guided weapons are designed to target North Korea’s nuclear, missile and long-range artillery assets as well as political and military leadership.

To counter North Korea’s numerous smaller naval vessels, South Korea has developed several ASCMs like the Haeseong I (Sea Star I/SSM-700K). This subsonic, turbofan-powered missile entered service in 2005. The surface-launched version (fitted to numerous warships and trucks) has a 150km range and the air-launched version (fitted to F-16s) 250km.

The subsequent Haeseong II was officially unveiled in 2013. It was developed to attack fixed targets and two variants are available: slant-launched (for naval use), which entered service in 2016, and vertical launch, which entered service in 2019. A turbojet engine gives a Mach 1+ speed and 500km range.

The Haeseong III is also a supersonic (nearly Mach 3) cruise missile, and entered service in 2013. The turbojet-powered weapon was developed to equip South Korean submarines (it can be launched from a torpedo tube) and can attack both land and sea targets.

The Hyunmoo-3 series covers a range of short to medium range turbojet-powered land attack cruise missiles. First deployed in 2006 was the Hyunmoo-3A, a road-mobile, ground-launched weapon with a 500km range. In 2009 the longer-range (1000km) Hyunmoo-3B was deployed, and in 2012 followed by the ship- and submarine-launched Hyunmoo-3C, with a 1500km range. Work is apparently underway on the even longer range (3000km) Hyunmoo-3D/4.

The Agency for Defence Development and LIG Nex1 are developing a new air-launched cruise missile for the new KF-21 fighter. Announcing the project in September 2021, South Korea said the new missile is in the research and development phase, and had recently undergone air-drop tests. The new missile bears a resemblance to the German/ Swedish Taurus KEPD 350K in Republic of Korea Air Force service. At the same time, South Korea revealed it has been developing and testing a ground-launched supersonic cruise missile, which will equip future destroyers. It is similar in configuration to the Yakhont/BrahMos.

TAIWAN

Like South Korea, Taiwan relies on its missile arsenal to make up a substantial part of its deterrent forces, with an eye on China. Lately it has accelerated cruise missile development for strike missions rather than just defensive actions.

A JASDF F-2 with ASM-2 ASCMs and other weapons (JASDF)

After developing the short-range Hsiung Feng I/IA anti-ship missiles from the Gabriel II, Taiwan developed the longer-range turbojet-powered Hsiung Feng II ASCM, after struggling to import a similar weapon. Service entry with Taiwanese warships was in 1990, and was followed by a static coastal version (1993), an air-launched version (1996), and a mobile coastal version (2001). Development of a turbojet tube-launched version stopped after Taiwan received submarine-launched Harpoons. Hsiung Feng IIIs will be upgraded to an Extended Range version by 2023 (from 160 to 250km), while a next generation version is under development.

Although similar in name, the Hsiung Feng IIE is a new long-range weapon designed for land attack missions – it is able to strike deeper into China. Testing began in 2005 and several years later an extended range version was developed, with a range of 1,200km+ (double the initial version). The missile is based on a mobile, land platform and is propelled by a booster rocket and turbojet engine.

The latest Hsiung Feng version is the Hsiung Feng III, unveiled in 2007 as Taiwan’s first supersonic cruise missile. A rocket booster/ramjet give a top speed of about Mach 2.5 and 120-150km range, although a 400km extended range version has apparently been developed.

Another Taiwanese supersonic cruise missile is the Yun Feng surface-to-surface weapon. It has enough range (1,000km+) to also reach deep into China. Development began in the late 1990s and is apparently still underway. A ramjet engine gives a Mach 3.5 top speed.

From 2011 a small number of Wan Chien air-to-ground cruise missiles entered service, with full operational capability in 2018. Maximum range of the turbojet-powered missile is 240km. It is carried by the F-CK-1 fighter.

VIETNAM

In 2020, Vietnam revealed what appears to be a localised Kh-35UE, called the VCM-01 and apparently developed by Viettel. The Kh-35UE is in turn an export variant of the Kh-35 air-launched ASCM, already in Vietnamese service. The Kh-35UE is a subsonic weapon with a maximum range of 260km (double the previous Kh-35).

Like other strategic weapons, cruise missiles give countries political and military influence disproportionate to their size. The Asia-Pacific region is a global hotspot for indigenous cruise missile development, spurred on by tensions between countries such as India and Pakistan, China and Taiwan, and North and South Korea. The region is also home to countries like Brunei, Malaysia, Singapore, and Thailand that have imported ASCMs. Australia, for one, also operates foreign cruise missiles like the Harpoon but is looking at acquiring additional weapons like the Tomahawk, Naval Strike Missile and JASSM-ER and, along with many other nations in the Asia-Pacific, developing hypersonic cruise missiles – but that is another story.
WHEN IS OFFSET NOT OFFSET?
WHEN IT’S AUSTRALIA’S DEFENCE POLICY FOR INDUSTRY PARTICIPATION

Defence offset is a controversial subject, attracting heated debate by policymakers, industrialists, and academics alike. Offset forms part of an acquisition programme and occurs because of the leverage a customer country can exert on overseas defence contractors to transfer technology and skill-intensive work. The leverage arises due to the existence of what is termed a defence buyers’ market, characterised by a paucity of high value sales opportunities and thus a preparedness by vendors to offer concessions to win orders.

S
tich concessions include offset whereby the procuring country literally seeks to ‘offset’ the high costs of acquisition through reciprocal vendor investment into the local economy. This offsetting investment may be directed towards commercial endeavour (civil or indirect offset) or defence work (direct offset), with the latter directed towards accelerating development of indigenous defence industrial capability. An example of defence offset is where Brazil purchases 36 Swedish JAS 39 Gripen fighters and as part of the deal ‘demands’ local capacity for in-country assembly and possibly also production capability of selected high-tech components and sub-systems.

In the early 2000s, well over 100 countries, rich and poor, had offset policies in place, but recently their popularity has been declining. A major reason is that offset usually incurs additional cost, which translates as a cost premium embedded in the primary defence contract price. A good example of the added costs associated with offset is the UK licensed build of the Boeing AH-64D Apache Longbow attack helicopter. The MoD procured 67 of these rotary platforms, with the first eight produced in the US, and the remaining 59 locally assembled over 1998-2004. The program cost around $4.75 billion, meaning that the unit cost was about $70 million. By contrast, Israel ordered 24 similar Apaches off-the-shelf from the US in 1999, paying around $23 million per helicopter.

Other offset criticisms include the challenges associated with securing state-of-the-art technology and high-level skills. Moreover, there are limited opportunities for creating local supply chains, enhancing R&D capacity, and promoting exports through OEM partnerships. The US argues it has no offset policy (notwithstanding ‘Buy American’ legislation), and the 2009 EU Defence Procurement Directive severely limited the use of direct offset and banned altogether civil offset.

Save for one or two exceptions, this suggests that offset is increasingly becoming a developing country phenomenon. Yet discontent with offset is also evident among more advanced developing states. For example, Kuwait has suspended its offset policy, South Africa’s offset program has been bedevilled by alleged endemic corruption with the policy delivering limited economic benefits, and India’s politicians have recently been calling for the abandonment of its ‘failing’ offset policy.

The apparent demise of offset poses a dilemma because defence procurement agencies view it as a means of accessing technology, while overseas vendors are principally interested in maximising shareholder value. This inevitable friction works against mutually beneficial offset outcomes. Stakeholder goal convergence is arguably the way ahead, resetting the offset model to ensure feasibility through flexibility.

BAE Systems calls this approach ‘industrialisation strategy’, defined as representing everything that formal offset is not. Industrialisation strategy incorporates foreign direct investment, joint ventures, subcontracting deals and other work packages. Agreements are intended to be long-term and partnership-based, with reciprocal investment forming part of the primary defence contract. There is no separate offset program, and thus no specific percentage investment targets, no multipliers (enhanced reduction of liabilities through investment into priority strategic sectors) and no penalties.

Industrialisation strategy has been implemented in the Middle East, and, post-Brexit, the UK MoD is actively considering reintroducing a flexible partnership-based industrial participation (offset).
policy. South Korea, moreover, is rumoured to be considering adapting its formal prescriptive offset policy, in part to emulate Australia’s unique defence industrial participation framework.

Australia’s transition from its hitherto prescriptive offset policy to the present partnership-based model is both interesting and instructive. Canberra launched its defence and civil offset policy in the early 1970s under the broad rubric of the Australian Industry Participation program (AIPP). Overseas defence and aerospace vendors and later a wide array of technology suppliers were ‘encouraged’ to support development of local manufacturing and support services.

Yet, offset policy was little understood at the time, loosely formulated, and lacked guidance on offset targets. Thus, while the policy was used for major acquisitions, such as the 1973 FFG warship project and the 1977 New Tactical Fighter program, it was applied in an ad hoc and inconsistent way. After sustained criticism, a ‘mandatory’ offset policy came into force in 1986 and applied to all government procurements exceeding $2.5 million with an import content of at least 30%.

The offset target was 30%, and multipliers were offered on investment channelled into local R&D capacity. The revised policy made clear that an offset premium must not be added to the primary defence contract price. These reforms improved policy clarity, but positive offset outcomes remained elusive. An Australian academic, Stefan Markowski, has published data showing that at the start of the 1990s, only 37% of obligations in a sample of 254 offset projects had been fully discharged. Overall, the judgement was that offset had done little to enhance Australia’s export potential or improve defence self-reliance or add substantial value via technology transfer.

In 1991, Canberra wound down its civil offset program. It abolished automobile offset, replaced aerospace offset with MoUs and introduced partnership for development arrangements for IT and telecommunications offset projects. In 1992, the government announced that industry involvement through focused provisions ‘within’ contracts would be prioritised over defence offset. Yet, incorporating industrial participation agreements into the primary defence contract failed to remove concerns over cost premiums. Indeed, there was a reluctant recognition that cost premiums were an immutable by-product of progress towards indigenous defence industrialisation. ‘Australianisation’ does not come cheap, even when the diluted goal is self-reliance in selected capabilities rather than full spectrum self-sufficiency.

In the new Millennium, Canberra began to introduce a succession of interventionist policies, such as the 2007 Priority Industrial Capabilities (PICs) and the 2009 Australian Industrial Capability policy, aimed at achieving essential national security through local in-country involvement. These were the policy foundations of later policies aimed at deepening Australian sovereign defence industrial capability, and included the 2016 Defence Industrial Policy Statement, Integrated Investment Programme (IIP), the 2018 Sovereign Industrial Capability Priorities (SICP) policy and the updated 2019 Defence Policy for Industry Participation (DPIP).

The policy thematic emphasising local industrial involvement is common across all these diffuse policies, albeit that the nuanced focus may differ. For instance, the IIP identifies six high-level capability streams, including: ISR, electronic warfare, space and cyber; maritime and anti-submarine warfare; and strike and air combat capabilities. Within these broad domains, 10 capability priority fields were identified in the 2018 SICP policy, including Collins-class submarine maintenance and technology upgrades, and aerospace platform deep maintenance. In 2021, four additional priority fields were added, comprising 1) robotics, autonomous systems and artificial intelligence; 2) precision guided munitions and hypersonics; 3) space; and 4) information warfare and cyber.

The DPIP acts to support these strategic policy objectives by providing tailored Australian industrial involvement solutions. Canberra offers neither official guidelines nor parameters regarding reciprocal vendor investment, but bids must incorporate opportunities to maximise local industrial involvement, and where appropriate, eventual export opportunity. To this end, policy has been strengthened through the application of more stringent ‘value for money’ requirements linked to all material and non-material procurements exceeding $4 million and construction services greater than $7.5 million. Tenderers will be required to articulate how they intend to utilise and develop Australian industry. These commitments will carry weightings in the bid evaluation process, and in the event of successful bids will become contracted deliverables. Industrial participation is presently undergoing several audits to compare the performance of suppliers against their obligations.

Australia’s Industrial Participation model is certainly an improvement on its erstwhile offset policy, but it needs to be if it is to exploit the opportunities arising from Australia’s exponential future growth in defence spending and foreign defence acquisition. The 2021-22 defence budget is $44.6 billion (around 2% of GDP), and is forecast to cumulatively exceed $575 billion over the present decade to 2029-30.

Some $270 billion of this sum will be allocated to upgrading military capability, primarily through acquisition of advanced foreign systems, including maritime ($75 billion), aerospace ($65 billion), land ($55 billion), cyber ($15 billion) and space ($7 billion). The policy logic of local industrial participation is intended to promote prosperity through investment in Australian industry, but begs the question as to what is ‘Australian’ industry, especially in relation to defence?

In 2018, 27 of the top 40 defence companies were overseas owned. For years, there have been waves of government-sanctioned takeovers by foreign defence primes, mirroring a process of defence globalisation that similarly impacted the UK’s defence industry. Aside from BAES, ‘footloose’ foreign defence multinationals now dominate UK defence production. Privatisation and globalisation were lauded as the optimal medium for maximising job creation and commercial efficiency, but this has now given way to fears of potential erosion of defence industrial sovereignty.

Similar fears exist in Australia, especially given Canberra’s apparent preference for what economists term the ‘international demonstration’ effect; in other words, the perception that west is best, when compared with indigenous Australian companies. In a February 2020 speech, Graeme Dunk argued … “Australian companies are those where control rests within Australia. Thales Australia, BAE Australia, are not Australian companies in this context as the control is held off shore locations, profits are returned offshore, and the really important decisions are made offshore”.

Dunk further argued that local industrial involvement in defence programs is declining, but that the rate of decline is faster for truly Australian companies. He stated that only about … “10 percent of the contracts placed by the Department of Defence is with Australian-controlled companies – while almost 40 per cent of the expenditure and the profits on another 50 per cent flows overseas”.

Indeed, in 2019, there were reports that not a single Australian company had been signed up to participate in the giant joint Command and Control (C2) information environment programme under JP9111. The Australian Industry & Defence Network (AIDN) voices broader industrial concerns over the implementation of industrial participation, indicating that its members are reporting
'significant frustration' at the lack of Australian industry involvement across the major new defence programmes.

The problem for Australia is that working with overseas prime contractors has become a sine qua non due to the economic infeasibility of cradle-to-grave major national programs. International industrial collaboration is also a non-starter, because regionally there is nothing to compare with, for example, Europe’s (three-partner) Tornado, (four-partner) Typhoon and (three-partner) Tempest fighter programs.

Thus, the only realistic acquisition option has regard to what might be termed the hybrid approach, of which there are two principal types. The first is military-off-the-shelf, involving local component and subsystems production. There is limited risk, and it represents the most cost-effective acquisition model. The relatively trouble-free acquisition of the Super Hornet fighter and C-17 freighter via this method demonstrates its value.

By contrast, Australia’s acquisition of 72 fighters through the F-35 global consortium has been problematical. Project risk has been dramatically reduced through final assembly in the US. While Australian industry simply operates as part of the F-35 supply chain, Canberra nevertheless finds it impossible to insulate against cost escalation, delivery delay and performance shortfall. Industrial participation is progressing, but there remains room for concern. An impressive $1.3 billion of F-35 related contracts has been achieved, which is expected to rise to $2 billion by 2023, but as a proportion of the reported $16 billion F-35 acquisition cost, these contracts amount to just 6% and 12%, respectively.

The second procurement option is the higher risk and more expensive foreign procurement local build model. Australia uses local build for several of its high cost, high technology procurement programmes, driven by the need to generate domestic defence industrial capability, promote economic multipliers and reduce its vulnerability on internationally extended supply chains.

An example of local build is the $35 billion Hunter Class FFG program, involving the local build of nine anti-submarine warfare frigates, and representing the biggest surface ship project in the history of the Royal Australian Navy. The prime contractor, BAE Systems Australia, anticipates that the project will create and sustain 5,000 local jobs over its life cycle, and at its peak in 2028 will contribute around $1 billion to the Australian economy.

The Hunter class vessels will be built at ASC’s Osborne Naval Shipyard in South Australia. The problem, however, is that Australian industrial participation has reportedly declined from 90% to 60% before finally hitting 50% (the same proportion that applied to the Air Warfare Destroyer program). Although still early days, Australian businesses have been invited to bid for contracts supplying equipment and materials for the prototyping blocks, like scaffolding, pipes, steel, deck coverings, cables, and insulation, as well as services, like outfitting and painting. These labour-intensive, low skill activities, fail to resonate with the aim of high value complex technology industrial participation.

Plans to locally build submarines have also proved controversial. In March 2021, the Morrison government confirmed that 60% of the $90 billion procurement of 12 French Barracuda-class submarines would be spent in Australia, prompting criticism of the low level of local industrial participation. The program also proved contentious because the original estimate for the boats was $50 billion, with the resultant near doubling of cost forcing economy measures to be introduced, such as the relocation of strategic complex hull fabrication capability from Australia to France.

Moreover, the program’s sudden cancellation September 2021 put at risk the $3.96 billion Canberra has already spent on the project’s design phase, accounting for almost half the total cost to date. The Barracuda program was replaced by an enhanced trilateral security partnership between Australia, the UK, and the US (AUKUS). At the heart of this partnership is Canberra’s acquisition of at least eight conventionally armed nuclear-powered submarines.

The AUKUS submarine project will involve local build, with construction planned at Adelaide. However, much uncertainty surrounds the build program, leading to the danger of rising risk and cost. An 18-month trilateral assessment effort has begun to identify an optimal pathway to deliver the intended capability, but local build will entail a high level of complexity, requiring evaluation of the full suite of requirements associated with nuclear propulsion, such as safety, design, construction, operation, maintenance, disposal, regulation, training, and environmental protection.

While concerns have been raised that this assessment period is excessively lengthy in the absence of clarity on the submarine’s design specifics, the major benefit of local build is that it will maximise industrial participation opportunities. The planned spectrum of opportunities for Australian industry participation ranges from capability design to complex project management, to construction and sustainment activities.

Yet, at what cost? The planned acquisition of eight nuclear powered submarines is estimated to reach $70 billion at an 'absolute minimum' but is 'highly likely' to be much greater than that figure. Indeed, an Australian Strategic Policy Institute Report argues that with inflation the cost could be as high as $171 billion. Moreover, it will be 18-years before the boats become operational, creating the possibility of a capability gap as Australia’s existing six Collins-class submarines may be forced to retire before the new nuclear submarines are available. Keeping the Collins-Class submarines in service beyond their decommissioning date will add considerably to cost. Finally, the eventual responsible disposal of the nuclear submarines’ radioactive waste once the reactors reach the end of their operational lives must also be factored into the overall cost equation.

In sum, Australia’s offset policy is dead, but lives on through the DPIP. Yet, aside from the demand for reciprocal investment, the policy is far removed from the prescription of formal offset. Flexibility is the dominant characteristic, both in terms of initial contractual negotiation and the nature of the IP projects undertaken. The policy rejects a ‘one-size-fits-all’ approach, and within the boundaries of identifiable sovereign industrial capability priorities, no distinction is drawn between commercial and defence industry.

This ‘light-touch’ institutional interventionism is wholly appropriate, given that contemporary defence supply chains comprise mostly high-tech commercial SMEs producing innovative dual-use technologies. In an era when Australian defence acquisition funding is dramatically rising, the DPIP policy aims to ensure that substantial levels of expenditure do not leak out of the domestic defence economy to create skilled jobs and high-tech investment in vendor economies.

Moreover, while a 60% level of industrial participation has been criticised in Australia, this is high by present international standards. Yet, Canberra needs to exercise caution. From a strategic level, it needs to identify the principal purpose of industrial participation: is it for economic benefit or for development of defence capability? Moreover, from a tactical level, there is, firstly, a need to ensure that local build of foreign weapons platforms and systems does not lead to unacceptable levels of cost escalation, and, secondly, that anticipated transfers of technology are technologically equivalent to the sophisticated foreign weapons acquired. This will be no easy task, given the obvious reluctance of overseas vendors to give away their technological inheritance.
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PLATFORMS - EQUIPMENT - SUPPORT - TECHNOLOGIES
NZDF SELLS 22 NZLAVS TO CHILE

The New Zealand Defence Force has finalised a sale of 22 surplus New Zealand Light Armoured Vehicles (NZLAVs) to the Chilean Navy for use by their Marine Corps. The sale is worth US $19.855 million and the vehicles will be shipped to Chile in two tranches, one this year and one in 2023.

Commander Defence Logistics Command, Commodore Andrew Brown, said it was pleasing to get a sale negotiated for the vehicles. Eight more NZLAVs remain on the market to sell. The prospect of a sale to the Chilean Navy has been under consideration and negotiation for over two years, with a number of NZ and foreign government consents required before any sale could be finalised.

The NZDF bought 105 NZLAVs in 2003 from General Dynamics Land Systems, Canada. One was written off after being badly damaged in Afghanistan and one is being used in Canada as a test vehicle. Commodore Brown said the remaining NZLAVs, numbering 73, will continue in service with the NZ Army.

NZDF’S 43 BUSHMASTER NZ5.5 VEHICLES WILL START ARRIVING LATE 2022

Production of New Zealand Army’s new fleet of 43 multi-purpose armoured Bushmaster NZ5.5 vehicles started at Thales Australia in Bendigo, Victoria during September 2021. The Bushmaster vehicles will provide New Zealand Army personnel with high levels of blast and ballistic protection. They are designed with a V hull, which redirects blasts out from under the vehicle, saving lives.

Ministry of Defence project team leader Gillian Rodger says a close working relationship, from the start of the process, has proven vital to the success of the project. “The Bushmasters are scheduled for delivery in late 2022 and will replace New Zealand’s current New Zealand Army Pinzgauer fleet.”

PROTECTED MOBILITY PROJECT – FURTHER PROGRESS

The Protected Mobility Project is replacing NZDF’s main operational land vehicle fleets, providing New Zealand troops with enhanced protection. This includes both armoured and non-armoured vehicles suited to a wide range of operations.

The Project is being run in stages over ten years, ensuring that New Zealand’s land forces remain suitably resourced for operations now and in the future.

- Phase 1: 2018 – 2024: Replace and enhance the capabilities offered by the current Pinzgauer fleet and operational Unimogs.
- Phase 2: 2025/2026 onwards: Upgrade or replace the NZ Light Armoured Vehicle Capability. Currently MRZR-D vehicles are being introduced into service. These vehicles fulfil the Project’s High Mobility (Light) vehicle category of a lightweight, compact offroad vehicle. MRZR will be used in roles including humanitarian and disaster relief (HADR) activities, movement of combat supplies, and casualty evacuation.

ARMY REGENERATES SKILLS AS IT WITHDRAWS FROM OP PROTECT

The NZDF has wound down its involvement with managed isolation and quarantine facilities (MIQ), called OPERATION PROTECT, after the Government announced the impending reduction in MIQ facilities. Unique NZDF personnel deployed/posted to OP PROTECT from 01 Feb 20 until 01 Feb 22 totalled 6290, of whom 3700 were regular and some reserve Army troops.

Major General John Boswell, Chief of Army, in an email to all Army personnel, wrote of “The need for all of us to pause, take stock and regroup”. Having done so, he then noted that Army will look to recommence training and regenerate capabilities.

“Let me expand on what I want this to look like. None of us should ever underestimate just how much OP PROTECT has impacted the NZ Army. It was a significant commitment, over an extended period, and it caused us to scale right back both our training and the capabilities we maintain. A significant number of individual courses were cancelled, collective training above platoon level effectively ceased, and our international exercise/training programme was put on hold. It was also a cause, but not the only cause, of increased attrition and a number of quality people made the decision to take their release from the Army.

“The Transition and Individual Respite period from April to July 2022, will be followed by a phase of Warfighting Function Regeneration from July 2022 until June 2024. This first phase will address the backlog of individual training, with prioritised regeneration of high readiness infantry and engineer capabilities, and the logistics and medical joint enablers that are critical for the delivery of short notice contingency response options.

“The first phase also includes those specialised capability bricks that support the delivery of joint capabilities and missions in our close region, like the Amphibious Beach Team on HMNZS Canterbury. Major overseas collective exercises and domestic training opportunities will occur during this phase but our commitment will be primarily focused on the provision of HQ staff and discrete capability bricks integrated with our partners.

“The second phase July 2024 to June 2026 is the regeneration of combined arms outputs primarily in a land environment, but also contributing to selected activities in a joint environment. Regeneration will occur firstly at Combat Team (Task Unit) and then at Battlegroup (Task Group) level and will include providing combined arms capabilities up to BG level for overseas training activities.”

AUSTRALIAN NIOA ACQUIRES NEW ZEALAND FIREARMS AND AMMUNITION WHOLESALE DISTRIBUTOR

Australian-owned NIOA has acquired Sportways Distributors to expand its presence in New Zealand. Sportways is a firearms and ammunition wholesale distributor and will be renamed as NIOA in New Zealand, building on NIOA’s relationships that already include the New Zealand Defence Force and New Zealand Police.

Founded in 1999, Auckland-based Sportways represents more than a dozen international suppliers, distributing rifles, pistols, shotguns, ammunition, outdoor gear and accessories to a large dealer network and law enforcement community throughout the country.
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