

# **DAILY NEWS**

14-16 MAY 2019 | CHANGI EXHIBITION CENTRE, SINGAPORE

an **experia** event

# Call for calm seas to aid global commerce



Singapore sits at the confluence of two key maritime trade routes through which around 25% of global traffic passes, which is worth billions to the ports and maritime facilities serving this aquatic artery. Indeed, the Port of Singapore is the second busiest in the world, behind Shanghai.

It was in this context that Singapore's Minister for Defence, Dr Ng Eng Hen, presented the keynote speech on the opening day of IMDEX Asia 2019, highlighting some of the commercial opportunities that serve as the foundation for the need to secure the maritime environment. 'This region at its heart is a maritime region,' he said. 'Literally and figuratively, we need calm seas to ensure global commerce continues.'

Traditional security risks in Asia-Pacific, such as piracy and illegal trafficking, have been joined by non-state actor threats and wider terrorist activity. Commenting on this, Ng said that terrorism could 'become endemic' unless regional countries 'come together' to combat the threat.

One example of recent international cooperation saw Singapore working with

regional partners to ensure the security of the summit between US President Donald Trump and North Korea's Kim Jong-un at Sentosa Island in 2018.

Furthermore, a variety of competing maritime claims among regional countries – from territory to marine resources – also bring the risk of future conflict or confrontation.

To this end, Ng spoke positively of a draft text agreed in 2018 by ASEAN countries and China in efforts to create a Code of Conduct in the South China Sea.

Following the keynote, Ng toured a number of stands on the show floor, including ST Engineering (pictured), where officials provided details regarding the range of solutions on display.

Also speaking at the opening ceremony of IMDEX Asia 2019, Vincent Chong, chairman of Experia Events, said that visiting delegates, officials and navy chiefs would benefit from the 'important platform' that the event provides in exchanging ideas and further maritime collaboration.

Around 23 high-level representatives from international navies are attending the three-day event.

By Richard Thomas

### **DAY TWO**

15 May 2019

#### **HIGHLIGHTS**

#### **Business Forums**

10am - 12pm & 2pm - 4pm

Join us at the business forums to connect with key industry leaders and experts in the Cyber Security and Innovation arena!

#### What's Next Start-Up Showcase

9.30am - 5.30pm

Hear from aspiring entrepreneurs on their innovative ideas and technologies that can help revolutionise the way shipyards, ports and naval bases are being managed and operated.

#### **Warships Display**

10am - 4.30pm

Leverage on this exclusive opportunity to step onboard over 20 warships from 15 navies around the world.

### Happy Hour Networking

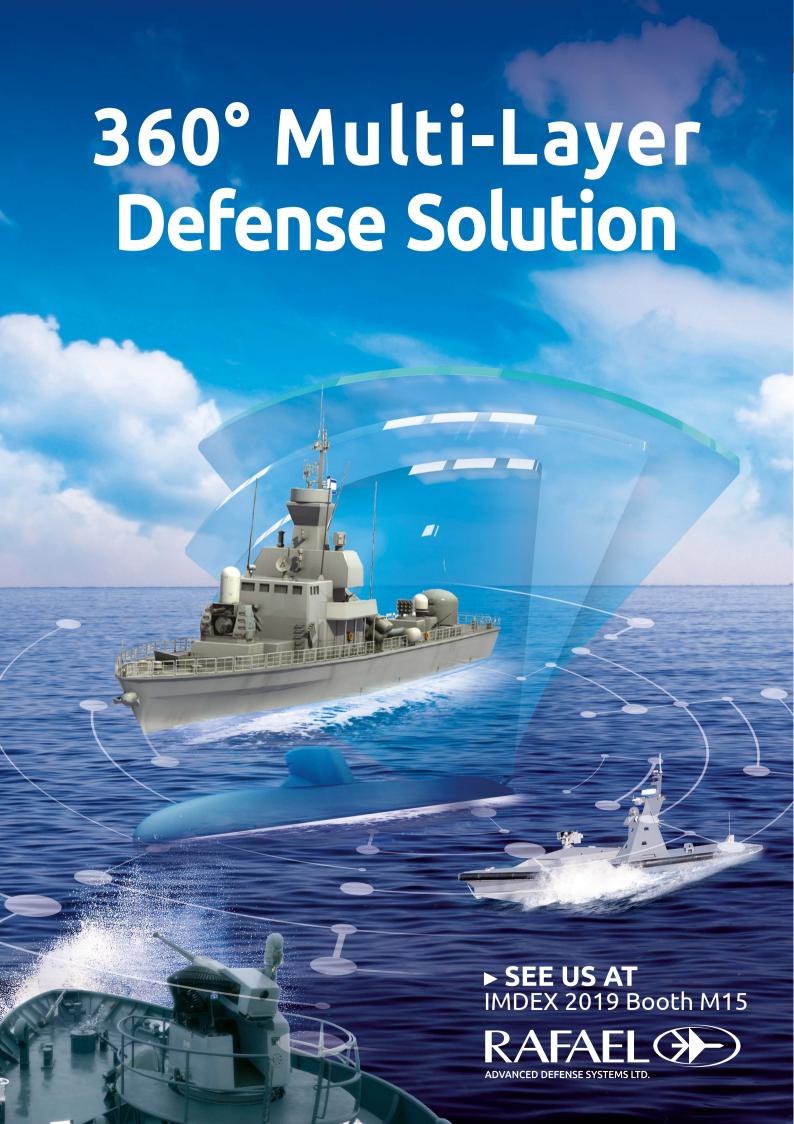
3.30pm - 5pm

Connect and foster meaningful relationships with industry professionals and key decision makers over drinks!

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Three editions of the show daily are being produced on site. The team can be contacted in the Media Centre.







# Capital ship visits Singapore for first time

#### RSS SINGAPURA

HMAS Canberra is making its maiden visit to Singapore, and one highlight for attendees at IMDEX Asia 2019 is the opportunity to visit this 27,000t LHD, one of two in the Royal Australian Navy.

The large vessel – designed for amphibious operations – is currently berthed at RSS Singapura, otherwise known as Changi Naval Base. Aboard are a series of vehicles and landing craft, as well as two MRH90 helicopters and four Airbus Tiger Armed Reconnaissance Helicopters. This is only the second time Australian Army Tigers have headed overseas.

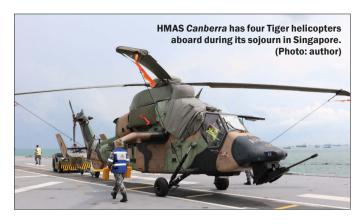
The landing helicoper dock (LHD) is part of a task force comprising five vessels and a P-8 aircraft that is performing *Indo-Pacific Endeavour 2019*. This is the third and largest iteration of the exercise series,

plus it is the first time that the joint task force has comprised all three Australian services.

Air Cdre Richard Owen, commander of Joint Task Force 661, spoke to *IMDEX Asia Daily News* aboard his flagship, which is now approximately halfway through its longest-ever deployment of three months.

Owen, an RAAF reservist, said Canberra departed from Sydney on its 'fantastic adventure' on 17 February, commencing with a work-up in the Southern Ocean. It then proceeded to Sri Lanka and India via Fremantle and the Cocos Islands, the latter being Australia's northwesternmost territory. After successful military and civil engagements, the task group conducted additional visits to Malaysia, Thailand and, most recently before arriving in Singapore, Vietnam.

'We've done quite complex moves whilst we've been on this engagement mission,' Owen



noted. These have included humanitarian assistance and disaster relief missions. He added: 'We're well on our way to a mature capability. *IPE 19* has been an opportunity not just to engage in the region, but to expand and grow that amphibious capability.'

HMAS Canberra sailed through the South China Sea twice, but Owen described all contacts with the Chinese navy as 'professional'. Nevertheless, Chinese warships continuously shadowed the vessel and its escort HMAS Newcastle throughout their normal sea transit. Owen stated that one purpose of the mission was to 'uphold the rules-based order'.

Later this year, the Australian Amphibious Force, under Joint Project 2048, should achieve final operational capability. Exercise *Talisman Sabre*, which will see the employment of both Australian LHDs, will be a culminating and repeatable demonstration of this amphibious capability in July.

Australia recently reached a 'favourable settlement' over repair costs with shipbuilder Navantia for the azimuth propulsion pods on the two LHDs that had developed issues in 2017. Owen confirmed the reliability of the LHDs, saying that the *Canberra* had no availability issues during its cruise.

By Gordon Arthur



#### STAND NO7

ST Engineering is promoting the latest member of its Vanguard modular family of surface combatants at IMDEX Asia 2019, the multirole Vanguard 130, with the number referring to its length in metres.

While scale models of existing designs were also on show – including the Vanguard 80, 95, 105 and 120 that cover OPV to frigate sizes – only a picture was

available of the Vanguard 130. Yeo Eng Teck, senior VP of marketing and business development at ST Engineering, told IMDEX Asia Daily News that the Vanguard 130 is optimised to act as a platform for AUVs, UAVs and USVs to improve reach and capability. UAVs can be launched from a stern helicopter flight deck, while USVs and UUVs can be launched from a side bay using the company's Q-LARS 2.0 launch and recovery system.

# ST Engineering leads with Vanguard 130

The Vanguard 130 would also carry a typical complement of missiles and guns for warships in the 4.000-5.000t class.

Autonomous systems within the ship would help reduce the core crew to around 30-40 people, Yeo suggested, plus helicopter and unmanned system detachments.

ST Engineering has been developing the Vanguard 130 over the past two years, Yeo said. The Vanguard family shares a scalable hull design, as well as equipment, systems and layout designs.

Singapore has announced that it will introduce a Multirole Combat Vessel (MRCV) to replace six Republic of Singapore Navy (RSN) Victory-class missile corvettes by 2030. These MRCVs will act as 'motherships' for autonomous systems. The Vanguard 130 concept therefore exactly reflects the thinking of the RSN for its future MRCV.

The RSN is also seeking a Joint Multi-Mission Ship – a larger and more capable vessel than four serving *Endurance*-class landing platform docks – for disaster relief or counterpiracy missions, for instance.

ST Engineering believes its Endurance 170 fits the bill, which is a flat-top design with five helicopter landing spots.

By Gordon Arthur



# Terma wins Indonesian Navy KCR-60 contract

#### STAND R11

Terma used the forum of IMDEX Asia 2019 to announce that it has won a contract to install its C-Series combat suite on four Sampari-class KCR-60 fast attack craft of the Indonesian Navy (TNI-AL).

The C-Suite will be retrofitted on boats three and four of the TNI-AL under a deal signed on 28 December 2018. The Terma system will replace Chinese systems originally fitted to these 460t platforms. Terma will also install the solution on two new vessels to be built by PT PAL. This contract represents Terma's first sale of a full combat suite to Indonesia.

The suite includes Terma's C-Flex combat management system, Scanter 4603 X-band radar, C-Guard decoy launching system and C-Fire EO fire control system. The company will integrate all KCR-60 shipborne sensors, guns, missiles and a data link.

Jens Maaløe, president and CEO of the Terma Group, said: 'Terma supports Indonesia's ambitions of developing its own defence industry. Transfer of technology and growing together with our partners are in line with our business philosophy.

'We have already, together with a local partner, established a local combat management system development centre based on our C-Flex solution,' he continued. 'This will... enable us to better support our Indonesian customers, and we look forward to strengthening the collaboration with partners in Indonesia.'

The nation's BAKAMLA maritime security agency already uses Scanter radars, plus the TNI-AL has C-Guard decoy launchers on several vessels.

Australia is another important market for Terma, which will install its Scanter 6002 radar on the navy's *Arafura*-class OPVs.

The company opened a subsidiary in Singapore in 2007. **By Gordon Arthur** 

# Drass makes progress with compact submarines

#### STAND J19

Drass Defence, taking the opportunity to showcase its range of compact submarines to the Asia-Pacific market, revealed that it is building multiples of its designs for undisclosed customers.

The company has developed a family of submarines for use in the littoral regions in roles such as maritime patrol, intelligence gathering and SF operations. Sergio Cappelletti, general manager, told *IMDEX Asia Daily News* that the last ten years of development in control system technology and miniaturisation have allowed such platforms to flourish in the international market.

At the smallest end, the 32m DG160 'Midget' has a crew of nine, with space for an additional six passengers. A standard payload could include two 533mm torpedoes, along with a number of optional

payloads. In the medium range, the 40m-long DG350, with an extra 50% crew, can sustain twice as many passengers or SF personnel. The type also has a double-hull design to reduce radiated noise propagation.

The largest boat in the family, the DG450, has a ready-to-dive displacement of 451t, endurance of 5,560km and an operational depth of 150m. Drass Defence states that, while the DG450 displaces only a quarter of that of a conventional SSK, the DG450 delivers similar attack potential.

Although well suited to littoral operations, the 450 model could also operate in blue-water conditions if required.

Cappelletti revealed that multiple DG160s and DG450s will be delivered under separate deals to undisclosed operators. Construction of the 160 began in 2018, and build for the latter contract will likely start in 2020.

**By Richard Thomas** 

### FSD displays patrol boat options



#### STAND P22

Security and Defence (FSD), a division of marine design and manufacturing OEM Ferretti Group, showcased its range of fast patrol boat options at IMDEX Asia 2019, including the 20m-long FSD 195.

Weighing around 36t, the FSD 195 can exceed 50kt

with a range of over 800km. A combat version of the platform (pictured) could transport a small number of SF operators for assault and interdiction missions. Such vessels are targeted at parapublic, coast guard and military services.

Andrea Ameli, operations director at FSD, told *IMDEX* Asia Daily News that one of the company's strengths is its ability to leverage the work of Ferretti Group in the civil and commercial boat sector.

Describing FSD as a 'platform producer', Ameli said that the company is able to work with clients in tailoring the platform and solution to their needs. This includes payload options, such as remote weapon systems (RWS) and sensors.

Indeed, FSD has conducted maritime tests with Leonardo's Hitrole 12.7mm RWS fitted to the FSD 195 platform and also discussed with MBDA the possibility of fitting a Marte missile to the vessel.

Other platforms displayed were the FSD 150, 245 and 350 fast patrol craft.

By Richard Thomas

# Dipping sonars for Philippines

#### STAND J05

Thales will supply its Compact FLASH (Folding Light Acoustic System for Helicopters) dipping sonar to the Philippine Navy (PN) for use aboard two Leonardo AW159 Wildcat helicopters.

The PN received these aircraft on 7 May, and they will be operated by Naval Aviation Squadron MH-40. The navy lodged its ₱5.363 billion (\$115.5 million) order for the helicopters on 29 March 2016.

The Compact FLASH low-frequency wideband system is the only sonar qualified for use with the AW159, and it has also been delivered to the Republic of Korea Navy.

**By Gordon Arthur** 



## Saab takes aim with lightweight torpedo

#### STAND K15

Testing of Saab's new lightweight torpedo, which commenced several months ago, is ongoing, with two prototypes now undergoing trials at the company's purpose-designed facility in Sweden.

The SLWT (Saab Lightweight Torpedo) is being developed for the Swedish Navy (where it will be known as the Torped 47), but the Finnish Navy has already ordered it as well. First handover to the former is scheduled to occur in 2023.

Sweden will first deploy the SLWT on its *Visby*-class corvettes, but it is designed for use from submarines (A26 and *Gotland* class) and helicopters (NH90) as well. The new weapon will replace the current Torped 45 also made by Sweden.

Saab highlighted the fact that this is the only new lightweight torpedo in development, which means it will utilise the latest fully digital passive/active homing and lithium-based battery technologies. Its batteries are optimised for both low- and high-speed travel, plus it can lure for 'several hours' when pursuing a submarine.

The torpedo measures 2.85m in length, weighs 340kg and has a 400mm diameter. Saab lists its speed as 10-40kt via pumpjet propulsion, and its range as over 20km.

The SLWT is designed to operate in difficult oceanic conditions such as shallow, brackish waters and salinity layers. The OEM therefore believes that the SLWT is an



ideal torpedo for the kind of conditions found in Southeast Asia. The fact that it is wireguided is extremely relevant for navies around the region, as it means operators can fully control the torpedo after it has been launched in busy and/or confined waters.

With the Republic of Singapore Navy (RSN) a user of Swedish-built *Archer*- and *Challenger*-class submarines, and with the Type 218SG Invincible class on the way from ThyssenKrupp, Saab obviously thinks IMDEX Asia 2019 is a good forum to promote its SLWT.

Furthermore, Singapore has already voiced its plan to introduce an MRCV (Multirole Combat Vessel) to replace six RSN *Victory*-class missile corvettes by 2030. These MRCVs will need torpedoes too.

By Gordon Arthur







The fleet of the Japan Maritime Self-Defense Force (JMSDF) is based around a large number of destroyers that are equipped with high-end ASW and anti-air warfare (AAW) sensors and weapons, which can protect Japan from its enemies in Asia-Pacific. The service also has a large fleet of dieselelectric SSKs that can deny an enemy the use of the seas around its islands.

The main threats that Japan currently faces comes from two of its closest neighbours. China's People's Liberation Army Navy (PLAN) is developing its surface and submarine fleet at an everincreasing rate. Each iteration of warship and submarine gets progressively better and more comparable in capability to Western vessels. In addition, China is using non-combatant units to encroach on the maritime territory of countries

in Asia-Pacific, which has caused a series of diplomatic incidents over recent years. North Korea presents a different type of threat based its nuclear missile capability, which has been advancing slowly over the years and could have the potential to hit targets in Japan.

#### Plan of action?

The JMSDF surface combatant fleet is divided into four Escort Flotillas - each of which has eight destroyers that are subdivided into two Escort Squadrons. The flotillas are equipped with the newest, most modern destroyers in JMSDF service, and one squadron in every flotilla will operate a Hyuga-class or Izumo-class helicopter carrier. These vessels began entering service in 2009 and are classed in Japan as Helicopter Destroyers (DDHs). The two Hyuga class (16DDH)

was commissioned in 2009-11 and displaces 19,000t. The following pair of *Izumo*-class carriers (22DDHs) are even larger at 27,000t and entered service in 2015 and 2017.

Japan's constitution, which limits its military forces to a purely defensive posture, has been gradually amended by the Liberal Party government under Shinzo Abe over the past decade. It has allowed for more joint operations with the USN and the procurement of the helicopter carriers under the premise that these are for defensive purposes only.

Under the nation's new ten-year National Defense Programme Guidelines (NDPG) and Medium Term Defense Plan (MTDP) released in December 2018, the two *Izumo*-class ships are to be upgraded in order to make them capable of carrying the F-35B short take-off, vertical

landing fighter aircraft, thus giving the JMSDF its first fixedwing carrier capability since World War II.

Japan is committed to buying around 20-40 F-35Bs from 2026, which will use a considerable amount of the defence budget. Jeffrey Hornung, senior research fellow at RAND Corporation, told IMDEX Asia Daily News that 'the thing that has got the most attention has been the retrofitting of the [Izumo-class] destroyers into quasi-aircraft carriers and the purchasing of the F-35Bs... From the maritime standpoint, having these retrofitted helicopter destroyers gives [Japan] an ability to complicate Chinese planning.'

However, this is not expected to be a permanent capability and there are questions about how the JMSDF will integrate the F-35B onto its carriers, which will fly using Japan Air Self-Defense Force (JASDF) pilots.



That said, the intention behind the procurement of the aircraft type is largely for land-based operations, as the F-35B can operate on the more remote island chains that are beyond the reach of aircraft from the mainland, and they are able to take-off and land from small airfields on the islands and remain hidden.

What Hornung believes is more important is the announcement in the NDPG/MTDP to build 'disruptive technologies' in the cyber domain, which does not specifically concern the maritime environment but is important nonetheless. 'If you read between the lines, that is not just defensive anymore... for if Japan is hit with some kind of cyber-attack, then it is capable of reaching back and touching that adversary with disruptive capabilities,' Hornung said.

Japan has been careful to avoid using the world 'offensive' – sticking to 'disruptive' – and assets could still be classified as defensive if only used when attacked. However, like the aircraft carriers, Japan's interest in cyber technologies does represent another blurring of the lines of what capabilities would be considered defensive or offensive in nature. There have therefore been discussions in the country about the type of cyber warfare capabilities it

should possess. 'There are difficulties if you cannot clearly identify where an attack comes from. By responding, Japan could be guilty of launching an attack if they hit the wrong country,' Hornung said.

#### **Enhancing the fleet**

Elsewhere, the JMSDF is continuing along its traditional lines of development in its surface fleet, with new destroyers and frigates replacing older models and improving AAW and ASW capability. In the subsurface domain, Japan is attempting to expand its submarine fleet by retaining more of its older Oyashio-class SSKs in service for longer in order to boost the fleet from 16 to 22 platforms as the newer Soryu-class (16SS) SSK continues to be introduced.

Japan builds its submarines on a strict annual drumbeat with production taking place at both Kawasaki Heavy Industries (KHI) and Mitsubishi Heavy Industries (MHI) shipyards. The latest boats of the Soryu class have been delivered since 2009, and 14 examples are expected in total. The most recent vessel of the type to be received by the JMSDF was the tenth in class, Shoryu (SS 510), which was commissioned in March 2019. The Soryu is larger than the Oyashio and has an x-shaped

rudder for improved manoeuvring capability in the littorals.

Other enhancements will be added to the *Soryus* from boat 11. *Oryu* (SS 511) – which was launched at MHI in October 2018 and is due to enter service in March 2020 – will be the first to be equipped with lithium-ion batteries in place of lead batteries. The final three SSKs due to be commissioned from 2021-24 will also be fitted with Li-ion batteries to enable longer sub-surface operations.

The newest additions to the JMSDF's surface fleet will be two new Maya-class (27DD) destroyers. Also known as the Improved Atago class, the pair are being built by Japan Marine United shipyard and displace in excess of 10.000t. Aware of the air defence threats, the AAW destroyers will be equipped with the latest version of the Aegis air defence system with SM-2, SM-3 and SM-6 missiles and the Cooperative Engagement Capability that will enhance interoperability with the USN.

The first ship, Maya, was launched in July 2018 and is expected to be commissioned in March 2020, with the second ship due to enter service in March 2021. The vessels will reinforce the existing two Atagoclass destroyers commissioned in 2007-08 and provide improved ballistic missile defence.

To boost its ASW capability, the JMSDF recently commissioned two new Asahi-class (25DD) destroyers in 2018-19. Built by MHI, the pair are a follow-on class from the earlier four Akizuki-class (19DD) destroyers that were commissioned from 2012-14 to replace the service's five older Hatsuyuki-class ships.

The introduction of these vessels is intended to provide an enhanced ASW escort capability, which will be further improved through the addition of another follow-on class of two ships known as 33DD destroyers. These are expected to be similar in design to the Asahi, and a programme is set to be approved in 2021 with construction to take place at KHI. The first 33DD is due to be launched in 2024.

Meanwhile, the JMSDF has initiated its acquisition of a new class of eight frigates under the 30DX programme. The boats will replace existing Asagiri- and Abukuma-class light destroyers.

A budget for the first pair of 30DX frigates was approved in August 2017, and construction started at MHI in 2018. The first example is scheduled for delivery in 2022. The second ship is under construction at Mitsui Engineering and Shipbuilding. Money for a second batch of two ships to be delivered from 2023 has also been set aside, although a formal contract is yet to be awarded.

The Akizuki-class destroyer JS Fuyuzuki sails in a group formation with US ships in 2018. (Photo: US DoD)





#### **Tri-service tension**

Although the JMSDF is enhancing its front-line warships, the rest of the surface fleet is being somewhat neglected. 'What is surprising is that you don't see any improvement or boosting capabilities in their oilers. They only have three the *Mashuu*-class oilers and the *Osumi*-class transport ships, so they are not moving in any direction there,' Hornung explained.

In addition, he said that the Japan Ground Self-Defense Force (JGSDF) is putting together a new Amphibious Rapid Deployment Brigade (ARDB) that essentially aims to build up a marine force that can undertake combat on Japan's islands and will include the procurement of new marine transport ships. 'It surprised me that the maritime forces were not involved - this was very much a ground decision,' Hornung said. He added that the JGSDF is 'under constant pressure internally' from the air and maritime domains to downsize and give up some of their budget 'and they are constantly trying to reinvent themselves'.

It does not appear that the JGSDF was taken seriously when an amphibious capability was first examined in 2008-09, with the JMSDF preferring to continue to focus on its budget for future AAW/ASW destroyer assets. However, although the ARDB is a JGSDF initiative, it will still need cooperation and support from the maritime

service – and this means more tri-service capabilities.

The issue with the new ARDB is that it is unlikely that 3,000 Japanese marines will be able to re-take any islands if China's PLAN with supporting air force and army assets have already invaded and become established.

The true value would come to light if Japan can anticipate an enemy landing and get the ARDB deployed to the islands first, getting boots on the ground. 'The problem is that [the ground forces do not] have the capability to get from point A to point B in a rapid way,' Hornung stated. The JMSDF and JASDF are able to quickly fill the battlespace with their platforms and capability, but the JGSDF must rely on other services for transportation outside of Japan. The new mobile transport ships can provide this for the ARDB, but they will need protection from the JMSDF.

The lack of cooperation between the elements of its military has been a serious limitation for Japan. The three services are very stovepiped, and there is very little integration. For example, the JGSDF's tanks are not able to fit inside the JASDF's new C-2 transport aircraft. 'The services get the capabilities they want and that they think are needed, but they are not really fully integrated. There is no managing body; even though you have the Joint Staff office, there has been no top-down heavy presence trying to ensure that

"If you read between the lines, that is not just defensive anymore... for if Japan is hit with some kind of cyber-attack, then it is capable of reaching back and touching that adversary with disruptive capabilities"

the capabilities are really going to work in an efficient way,' Hornung said.

The JGSDF is still the nation's dominant service, and despite the unlikely event of a land invasion, this standing has not changed. Although the service has reduced its inventory of heavy armour and artillery, it is finding new missions with air defence and the ARDB. Meanwhile, the JMSDF is still focussed on ASW and ISR, with the JASDF's attention on scrambling and intercepting aircraft from China.

This needs to change if Japan is to enhance its capabilities and become a more effective force. Air intercepts are important, but the JASDF needs to learn how to do more close air support if the country wants to develop an amphibious force, as the services will be required to work together. The JMSDF has the most experience cooperating with another service – the USN – so it could take the lead here.

#### Requiring resilience

Another issue for the Japanese military concerns resilience and sustainability. Horning said that there is a focus on this in the NDPG, which suggests that

stocks and supplies for extended operations could be built up. 'In the past, munitions, fuel and stockpiles of equipment have been easiest to cut and were cannibalised so that the money can be put into capabilities like shiny aircraft or destroyers,' he explained. 'This time, there is an emphasis on sustainability and a resilient capability, but if there is a budget devoted towards stockpiles, that means there will be less [funding] for the platforms and what Japan wants to achieve in the MTDP.'

With a limited budget (estimated at \$44 billion for FY2018-19), it is not clear if all the aims and ambitions of the NDPG and MTDP will be met. According to Hornung, about 47% of the defence budget is allocated for personnel costs, with the remaining half divided between spending on past and current programmes, R&D on future programmes and supporting bases in Japan.

'There are a lot of highperforming capabilities that Japan wants to acquire that are expensive,' Hornung said. 'I am not confident they are able to hit all those because of the budget. If you look at past iterations of NDPG and MTDP, they are not always met – the objectives are not always achieved.'

Overall, although the Abe government's new defence policy makes some moves towards addressing the new regional challenges, it does not go far enough to introduce a modernising agenda and reform either the services or their equipment. The JMSDF will continue to develop its destroyer, frigate and submarine force, and whilst it has been at the forefront of integration with US naval forces, perhaps it is time to get to know its own sister services as well. ■

New Soryu-class submarines are being added to the Japanese fleet. (Photo: Gordon Arthur)





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# Surface advantage

As a region dominated by oceans and maritime areas, Asia-Pacific is seeing gradual adoption of USVs for civilian and defence applications as militaries become more accustomed to use cases in addition to likely operational practices. **By Gordon Arthur** 

Within Southeast Asia,
Singapore is doubtlessly the
furthest along in its utilisation
of USVs. For example, the
Republic of Singapore Navy
(RSN) was an early adopter of
Rafael's Protector, the world's
first operational USV. The RSN
deployed these platforms in
the Gulf of Aden and Arabian
Gulf, typically armed with a
7.62mm machine gun.

#### **Under development**

As well as acquiring Israeli USVs, Singapore has developed its own indigenous solutions. ST Engineering Electronics has two USV products: the Venus family and the conceptual Long-Endurance Unmanned Surface Vessel (LEUSV) that the company first promoted at IMDEX Asia

2017. The LEUSV is a 45m-long craft that can perform persistent coastal surveillance tasks, and it boasts an intelligent power-management system for 28-day endurance. The type also employs computational fluid dynamics techniques for greater speed, higher manoeuvrability and better seakeeping.

The RSN will utilise an MCM combo based on the Venus USV. One unmanned vessel has a Thales Towed Synthetic Aperture Sonar (T-SAS) to detect and classify mines. It can launch in 10min, compared to 45min being craned from a regular MCM vessel (MCMV). The other half of the unmanned team consists of a 16m-long Venus with an ECA K-STER for mine detection and neutralisation. The USVs are

controlled by a two-person crew in a 20ft container that is deployable on RSN ships. This unmanned pairing will eventually replace *Bedok*-class MCMVs.

Maj Lim Yoong Seet, officer commanding of the RSN's Unmanned Underwater Systems, previously said that in the future, a coastal defence variant based on the Venus 16m hull will perform patrols around Singapore, thus freeing up *Independence*-class vessels for more critical duties at greater ranges. He foresees that the 30t vessel with 36h endurance will carry a weapons payload heavier than a 12.7mm machine gun.

ST Engineering Electronics continues to develop payloads for the Venus, including a dipping sonar and one featuring a high-power microwave that can disable outboard motors of hostile vessels. From late 2016, Singapore's Police Coast Guard evaluated a 9m and 16m Venus fitted with an automatic fire-extinguishing system and loudhailers for constabulary duties.

Further north, DefTech in Malaysia displayed its prototypical Todak USV in Kuala Lumpur in 2018. This vessel is being developed in collaboration with the International Islamic University Malaysia and represents the company's first foray into USVs. The joint project kicked off in late 2017, as DefTech eyes a future Royal Malaysian Navy requirement for USVs to patrol and conduct surveillance.

Thai shipbuilder Marsun displayed a scale model of a second-generation USV measuring 10m long at a defence exhibition in Bangkok in 2017. Two 300hp outboard engines will provide a top speed of 45kt for the platform, which has a glassreinforced plastic hull. The Royal Thai Navy is interested in USVs suitable for harbour/riverine patrol, base protection, research tasks and reconnaissance. Marsun previously partnered with the service to create the 6m-long optionally manned **ROBAST** (Riverine Operation Boat Autonomous Surface Technology).

#### On top down under

Australia is also earnestly pursuing unmanned technology. For example, Ocius Technology has been developing its Bluebottle persistent USV since 2008. The company received a \$2.1 million contract for a capability and technology demonstrator in 2015, with a goal of creating a sustainably powered USV capable of carrying a range of sensors. The vision is for multiple platforms to be despatched to monitor Australia's maritime territory as an adjunct to patrol aircraft, warships and submarines.

Ocius' second-generation Bluebottle, *Bruce*, is 5.6m long. It collects solar and wind power to drive its motor and, if there is



neither, the platform harnesses wave action. It is capable of 5kt speeds, requires no fuel and averages 50W of power under 8h of sun per day. Two vessels fit inside a 20ft shipping container for easy transportation. A special design feature is the solar sail that automatically furls like a bird's wing into a deck recess when it encounters Sea State 5 or above.

Robert Dane, CEO at Ocius, told IMDEX Asia Daily News: 'We're really happy with the way [the Bruce] is performing.' He said a recent focus for the company is its work with the University of New South Wales to develop software that will enable the vehicle to communicate with additional Bluebottles and other assets.

Ocius is also working in collaboration with Thales Australia so the Bluebottle can host a range of sub-surface sensors, one of which is a thin-line sonar array. A keel winch can lower the sensor to a depth of 100m. Future payloads include EW and gateway and underwater communications. The Bluebottle can accommodate a 300kg payload.

A major milestone for *Bruce* was the *Autonomous Warrior* 18 demonstration in Jervis Bay during November 2018. There, it integrated and communicated with other manned and unmanned assets in various MCM, counter-arms smuggling and ASW scenarios.

In the same month, Ocius announced that it had been awarded funding of A\$1.7 million (\$1.2 million) by the Defence Innovation Hub to 'determine the viability of an intelligent command-and-control network of persistent unmanned surface vessels'. This will enhance the Bluebottle's ability to patrol, clear mines, monitor the environment and conduct SAR missions, with a network of intelligent and persistent USVs to be fielded.

The latest evolution is *Bob*, which commenced its initial sea trials on 26 March. Dane enthused: 'Particularly pleasing was that algorithms and software functions that were developed and optimised over two years on the original *Bruce* copied seamlessly into *Bob*. For example, waypoint sailing, auto tacking upwind, Figure 8 station holding etc all operated flawlessly and autonomously.' *Bob* has also been tweaked to improve its performance and robustness.

In terms of the Bluebottle's future for defence applications, Dane said a decision could occur in 2020. In addition to the Royal Australian Navy (RAN) and Department of Home Affairs, Ocius views scientific institutions, border security, the oil/gas sector and other industrial operators as potential users.

Steber International, an Australian fibre-glass boat manufacturer, won a \$4.7 million contract in late 2017 to build five vessels configured as USV and MCM support boats for the RAN under Project Sea 1778 Phase 1 Deployable Mine Countermeasures. The 38ft-long USVs, to be delivered in 2018-19, can reach speeds of 25kt and carry payloads exceeding 3t, which include a towed sonar and ROV for underwater mine detection and disposal. Steber is working with prime contractor Thales Australia on this project.

Giving a glimpse into the future, RADM Jonathan Mead, whilst he was the RAN's head of navy capability, commented: 'New autonomous and remotecontrolled technologies deployed from within the maritime task force provide the opportunity to find and dispose of sea mines more safely and efficiently... In the 2030s. Defence will seek to replace its specialised minehunting and environmental survey vessels with a single fleet of multirole vessels embarking advanced autonomous and uninhabited systems.'

#### **Market hotspot**

China is a hotbed of USV development, and we may expect growing Chinese penetration of the export market, as has occurred with the nation's UAVs. Beijing is displaying some creative designs, one example being an armed unmanned amphibian christened the Marine Lizard.

The Wuchang Shipbuilding Industry Group, a subsidiary of

the China Shipbuilding Industry Corporation, delivered a prototype hull to the Qingdao Wujiang Technology Company for systems integration on 8 April this year.

The trimaran-hulled vehicle is 12m long and 4.14m wide. It displaces 14.7t and can reach a top speed of 50kt via twin waterjets powered by a hybrid diesel-electric system. When approaching the shore, the Marine Lizard lowers four track runs from beneath its belly, allowing it to move 20km/h cross-country. Sensors fitted aboard the autonomous amphibian include an EO system and radar. Its weaponry will consist of two machine guns and a vertical launch system for small anti-ship missiles and surface-to-air missiles (SAMs).

Wuchang Shipbuilding confirmed that the Marine Lizard will be available for export, as it was 'developed with the needs of international clients in mind'. However, the platform has presumably gained the attention of the People's Liberation Army Navy (PLAN), as it could be used in an amphibious lodgement where a swarm of Marine Lizards lead an attack following artillery and air strikes, and provide suppressive fire for follow-on troops.

As another example, Zhuhaibased OceanAlpha hosted a technology demonstration involving 56 USVs performing synchronised formation





manoeuvres on 29 May 2018. An 'autonomy module' gave the 1.6m-long ME40 USVs real-time decision-making capacities to perform high-risk movements.

The demonstration occurred at the Wanshan Marine Test Field, which was established earlier in 2018 near Zhuhai. The first in Asia, its area initially covers 22km². However, once complete, the field will measure 772km², making it the largest in the world. Featuring a telecommunications network, navigation radars and automatic mooring systems, the site will be invaluable in China's development of USVs.

One platform to be tested there is an unmanned 500t cargo ship, which measures 50m in length and has a 930km range for inland navigation and island resupply. In December 2017, Yunzhou launched this Cloudborne project, which is still in development and will be first tested for island resupply tasks.

OceanAlpha offers a wide range of USVs for environmental monitoring, surveying and hydrology. For maritime security, there is the 5m-long M75A. China's Port Public Security Bureau, Maritime Police, China Coast Guard, Border Defence and Fishery Administration are either actual or potential customers. The OEM also claims to have made 300 sales of its 7.5m-long L30 USV to commercial and government markets in China, including the L30B fire control and rescue variant.

#### **Pushing capabilities**

In September 2017, Harbin **Engineering University and** Shenzhen-based Hispeed Boats completed joint development of what they claimed is the world's fastest USV. Tianxing 1, displacing 7.5t and measuring 12.2m long, can reach speeds of over 50kt. Its hull resembles that of a hovercraft, and the Tianxing 1 is emblematic of the close cooperation between research institutes and commercial companies to produce platforms suitable for military use.

At defence shows in Asia-Pacific, Poly Technologies has been pushing a USV from Harbin Engineering University, the 13m-long Nezha-1. This trimaran-hulled vessel can achieve 70kt, a figure surpassing the *Tianxing 1*. A representative noted that China's navy trialled the Nezha-1 for base protection, and Poly Technologies lists potential payloads such as precision-strike missiles, a remote-controlled weapons station and a soundwave active-denial system.

Another Chinese USV is the 4.5t SeaFly from Beijing Sifang Automation, which said in December 2017 that it was ready to commence production of the 10.2m-long platform.

Elsewhere on the market, the PLAN completed trials of the Huster-68 USV in January 2018. This 6.8m-long vessel – developed by the Shenzhen Huazhong University of Science "New autonomous and remote controlled technologies deployed from within the maritime task force provide the opportunity to find and dispose of sea mines more safely and efficiently."

and Technology – joined formations of other USVs to surround a target vessel. Such USV swarming tactics are a common theme in Chinese R&D, and they could be used to harass ships in places like the South China Sea.

The China Shipbuilding and Offshore International Company is also developing a USV via its Jiangsu Automation Research Institute (JARI). It has created an armed 20t vessel called the JARI **USV Multipurpose Unmanned** Combat Boat, It measures 15m in length, has a top speed of 42kt and a range of 930km. Sensors include a phased-array radar, SATCOM and variable-depth sonar. Its armament could extend to a 30mm cannon, small antiship missiles and SAMs, plus lightweight torpedoes.

Elsewhere in East Asia, LIG
Nex1 in South Korea is
developing the Sea Sword USV.
The company exhibited a Sea
Sword concept model at an
indigenous defence exhibition in
October 2017, which was fitted
with a 12.7mm machine gun,
towed-array sonar, torpedoes
and missiles to show possible
payloads. The Republic of Korea
Navy (ROKN) tested the first

8m-long prototype in 2017, while a second Sea Sword prototype (11m in length and displacing 7-8t) was supposed to be ready by December the same year. South Korea faces fast boat, hovercraft, submarine and mine threats from North Korea, so USVs would give the ROKN an extra line of defence.

In April 2018, India's Garden Reach Shipbuilders and Engineers (GRSE) signed an MoU with Elbit Systems to potentially produce the latter's Seagull USV. It is believed that GRSE engaged in preliminary talks with the Indian Navy (IN) about this product to fill a capability void caused by recently decommissioned MCMVs.

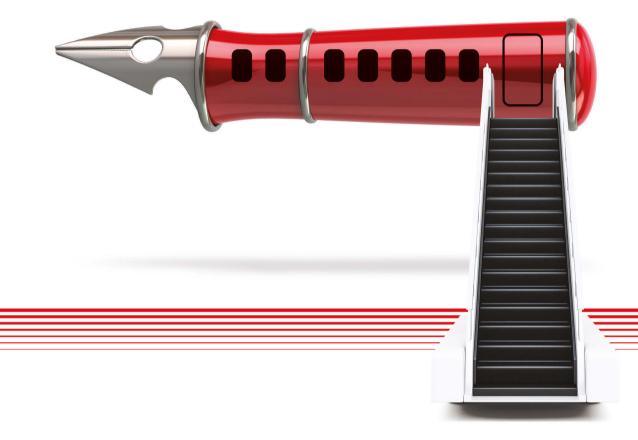
Indeed, in the IN's hunt for a USV, an Rfl was released on 14 May 2018 for 12 USVs and a simulator. Four mission requirements in replaceable mission modules were listed: ASW, ISR, force protection and MCM. The hulls are to be up to 12m long, and the complete package containerised. The RfI did not list specific sensor/ weapon requirements, instead inviting vendors to state what acoustic warning device, antisubmarine weapon. EO/IR sensor. EW suite, radar, small-calibre weapon or sonar they can offer.

#### Race to the finish

As can be detailed from the range of systems under development or consideration, unmanned technologies will play a significant role in determining the unmanned capabilities that the Asia-Pacific region – in both an industry and operator context – will be able to field in the future.

Given the contested nature of the region's waters, any advantage obtained by one country over another will have a significant effect.





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# Layered defence

**Ran Tavor**, VP and head of Rafael's Naval Systems Directorate, talked to *IMDEX Asia Daily News* about the Israeli company's naval product portfolio. **By Gordon Arthur** 

At the top of the list of Rafael's offerings is the 360° multi-layer defence against modern threats in both littoral and bluewater arenas, including naval area defence, swarm attack defence and torpedo defence.

Tavor commented: 'Rafael's layered defence approach against swarm attack demands an adequate protection capability.' He pointed out that this 'capability is ultimately derived from a threat assessment, which among other parameters includes the number of targets comprising the swarm, their size, velocity, ammunition and the geography of the littoral arena'.

#### **Against future threats**

He explained that layered solutions 'include long-range discrimination, allowing for more flexible rules of engagement, close-to-shore target separation capability, in-bay/harbour target discrimination, overcoming obstructions, the ability to receive external GPS coordinates and near-target affirmation of identification'.

To counter such threats, Rafael offers the Spike series of surface-

to-surface missiles and the Typhoon RWS (Remote Weapons Station) family, depending on the range of the threat. 'There are various possible combinations of how to fully deploy such a layered defence that take into consideration current and future threat definition, cost effectiveness and available reaction time,' Tavor explained.

A brand new product suitable for 360° multi-layered defence at sea is the Typhoon Mk-30c stabilised RWS. Possessing a 70° elevation range and coupled with airburst munitions, it can defeat small/medium UAVs.

'The new Typhoon Mk-30c benefits from experience gained by Rafael over two decades of R&D, greatly enhanced by the actual experience of its customers. In this new product, emphasis was put on compact design, ease of maintenance, low lifecycle costs and extending capabilities against the latest emerging aerial and asymmetric swarm attack threats,' Tavor told IMDEX Asia Daily News.

The RWS features the Mk44 Bushmaster 30mm gun, which fires all NATO-standard 30x173mm ammunition rounds.

including airburst munitions, with adjustable rates of fire from single shot up to 200 rounds per minute. Its magazine holds 200 ready rounds. Rafael revealed that the Typhoon Mk-30c has already been supplied for Peruvian Navy frigates.

#### **Regional potential**

Rafael has enjoyed considerable regional success. According to Tavor, the company 'has always seen the Asia-Pacific market as strategic and important.

'In the past few years, Rafael has had a number of important marketing achievements in the region, which include the sale of Spike precise tactical missiles [including the ER and NLOS variants], the Protector USV, Typhoon RWS and others we cannot elaborate on,' he said.

The OEM has also sold EO detection and surveillance systems, EW sensors and jammers, network and C4I systems and underwater systems to Southeast Asian navies. 'These naval combat systems ensure the highest level of ship protection as well as precise and discriminate lethality,' Tavor claimed.

'There is immense further potential in the Asia-Pacific region for Rafael, particularly with the increase in traditional and new threats,' he continued. 'We are currently competing in a number of different programmes, as we try to team up with leading OEMs and industries as part of our strategy of cooperation and readiness to transfer knowledge and production for local manufacturing.'

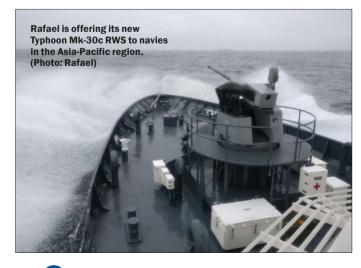
Elaborating on the latter, Tavor added: 'Rafael's strategy of creating partnerships with companies and OEMs in Israel



and around the world has led to over 100 offset activities and industrial cooperation agreements organised with over 20 countries worldwide. Over the last decade, international business activities have been steadily expanding across the globe, with Rafael acting as either prime contractor or subcontractor, capitalising on its strengths at both system and subsystem levels.'

He explained that the Asian naval market is 'characterised by high-end technology' and 'very good understanding'.

Tavor concluded: 'We are encouraged by bold moves that some of our customers in the region have made in the past few years, adopting both new and existing capabilities. We are engaged in talks with many potential customers in the region regarding current and future naval programmes, and we appreciate their capability ambition as well as their understanding of the threats and of Rafael's ability to provide them with the systems that will best address them.' ■





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# Asia-Pacific submarine fleets

Submarine manufacturing is becoming more popular across the region

The oceans surrounding the maritime countries of the Indo-Pacific region are getting increasingly crowded as more and more navies acquire and deploy submarine capabilities.

According to analysis from Shephard Plus, there are currently over 100 conventional and nuclear submarines operated by countries in Asia-Pacific, with active procurement programmes in 11 countries.

#### **Dominant power**

China has the largest submarine fleet in the region. Although exact numbers are not confirmed, in its 'Military and Security Developments Involving the People's Republic of China 2019' report published in May, the US DoD estimated that Beijing's submarine fleet would total between 65 and 70 platforms by 2020.

China has also had significant success with exports. Both Pakistan and Thailand have agreed to purchase variants of China's Type 039A/041 Yuan class, with Pakistan signing an agreement for eight platforms for an estimated \$5 billion in 2015. Thailand approved the purchase of the first of three Yuan-class boats in 2017, priced at \$393 million each. China has also sold two Ming-class submarines to Bangladesh.

#### **National projects**

While some countries are content to buy in a submarine capability, for others the underwater platform is seen



as a key strategic domestic manufacturing and support.

For example, Japan has a long-standing submarine manufacturing capability, with Mitsubishi Heavy Industries and Kawasaki Heavy Industries building the Oyashio-class and new Soryu-class.

In South Korea, the KSS-II and KSS-III submarines have been built by Daewoo Shipbuilding and Marine Engineering and Hyundai Heavy Industries.

For Australia, the Naval Group's Shortfin Barracuda design was selected for the \$36 billion Project Sea 1000/Attack- class programme and will be manufactured by ASC at a new facility in Osborne, South Australia. ASC also built the Collins class, based on a Type 471 design from Swedish shipbuilder Saab Kockums.

Indonesia's Nagapasa class (Type 209/1400) is being built through a workshare with South Korea that will eventually see the sixth and final vessel in the class built wholly in Indonesia.

#### **Full service**

Malaysia has two Scorpene submarines, both commissioned into the Royal Malaysian Navy in 2009. Naval Group supports Boustead DCNS Naval Group in maintaining them, as well as helping to deliver a service life extension programme that was announced in November 2015. A follow-on In-Service Support 2 maintenance contract is expected to commence in January 2020, with a tender and discussions opening in mid-2019.

For a free trial of the Shephard Plus defence market intelligence service, visit plus.shephardmedia.com

























TABLE: Submarines on order and delivered in Asia-Pacific, listed by country

Country and capability	Number ordered	Number delivered
AUSTRALIA	18	6
Attack class (Project Sea 1000)	12	0
Collins class	6	6
BANGLADESH	2	2
Ming class/Type 035	2	2
CHINA	66	62
Improved Kilo class (Project 636)	10	10
Jin class (Type 094)	6	4
Ming class (Type 035)	12	12
Shang class (Type 093)	6	6
Song class (Type 039)	13	13
Yuan class (Type 039A/041)	20	17
INDIA	10	2
Arihant class (Advanced Technology Vessel)	4	1
Kalvari class (P-75)	6	1
INDONESIA	11	6
Cakra class (Type 209/1300)	2	2
Chang Bogo class (Type 209/1400)	3	2
Nagapasa class (Type 209/1400)	6	2
JAPAN	14	10
Soryu class (16SS)	14	10
Oyashio class	10	10
MALAYSIA	2	2
Perdana Menteri class (Scorpene)	2	2
PAKISTAN	8	0
Yuan class (Type 039A/041)	8	0
SINGAPORE	4	0
Invincible class (Type 218SG)	4	0
Archer class	2	2
Challenger class	4	4 (2 in service)
SOUTH KOREA	30	19
Dosan Ahn Chang-Ho class (KSS-III)	9	0
Son Won-II class (KSS-II/Type 214)	9	7
Chang Bogo class (Type 209)	12	12
TAIWAN	2	2
Hai Lung class	2	2
Hai Shih class	2	2
THAILAND	3	0
S26T SSK/Yuan class (Type 039A/041)	3	0
VIETNAM	6	6
Improved Kilo class (Project 636)	6	6





## **IMDEX 2019**

## Wednesday, 15th May 2019

#### **Show Opening Hours**

14th May 2019 **12.00pm to 5.30pm** 

15th & 16th May 2019 9.30am to 5.30pm

#### **Business Forums**

Wed, 15th May 2019 \$75 per person, per forum

Gain valuable insights on the latest developments in maritime security and defence through two thought-provoking forums conducted by key industry leaders and experts in the Cyber Security and Innovation arena. Leverage on this exclusive opportunity to connect with key international defence buyers, government agencies and industry leaders.

#### **Cybersecurity in the Maritime Domain Business Forum**

Function Room 1, 10am to 12pm

#### **Innovation in the Maritime Domain Business Forum**

Function Room 1, 2pm to 4pm

Proceed to the Conference Counter at the registration area to register and join us today!

#### **Warships Display**

Wed & Thurs, 15th & 16th May 2019

Changi Naval Base, 10am to 4.30pm

Step onboard over 20 warships from 15 navies around the world and explore the fascinating naval systems and technologies within. Hop on the complimentary shuttle service from Changi Exhibition Centre to view the Warships Display at Changi Naval Base.

Only registered trade visitors, exhibitors and delegates can to visit the Warships Display.

#### **Happy Hour Networking**

Wed & Thurs, 15th & 16th May 2019

Experia Events Booth J30, 3.30pm to 5pm

Connect and foster meaningful relationships with industry professionals and key decision makers over drinks! What's more, seize this opportunity to have a taste of Singapore with the Singapore Sling!

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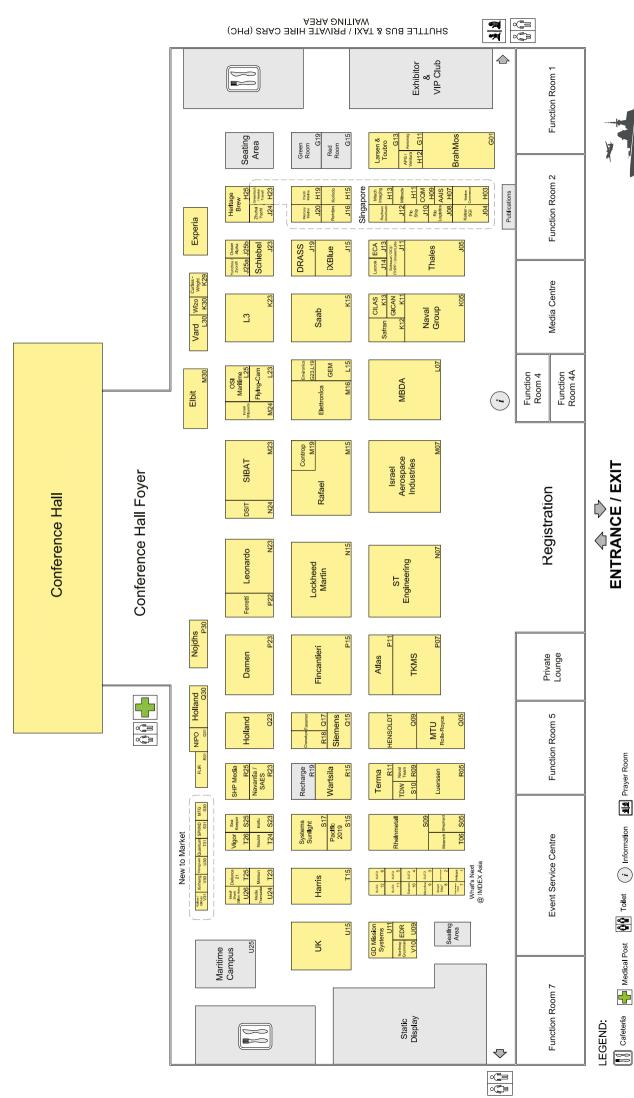
#### **What's Next Pitching Session**

Thurs, 16th May 2019

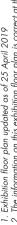
Function Room 1, 11.30am to 12.30pm

Six start-ups from **France**, **India**, **Philippines**, **Singapore** and **United States** will present new solutions to tackle key challenges in Naval Bases, Ports & Shipyards, Shipbuilding & MRO, Supply Chain & Logistics Support and Ship Operations at the **Shipyard 4.X Challenge**.

Join us at Function Room 1 tomorrow and hear them pitch their innovative solutions to our panel of judges.







**Note:**1. Exhibition floor plan updated as of 2.5 April 2019
2. The information on this exhibition floor plan is correct at the time of printing and may be subject to change.
3. Exhibition floor plan is for illustration purposes only. (NOT TO SCALE)



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