SUBMARINE SCIENCE TECHNOLOGY AND ENGINEERING

SubSTEC5

CONFERENCE 2019

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WELCOME to the
5th SUBMARINE SCIENCE, TECHNOLOGY & ENGINEERING CONFERENCE 2019

SubSTEC5

Innovation and Investment in the Sub-sea Environment

Submarine Institute of Australia

www.submarineinstitute.com

CONFERENCE HANDBOOK 2019

GOVERNMENT OF WESTERN AUSTRALIA

DEFENCE WEST

The case for Full Cycle Docking in WA

Relocating FCD to WA is in the national interest

Moving FCD to WA will co-locate sustainment work with operations in line with international best practice. It will reduce the workforce risk of trying to deliver the Attack class, Hunter class and Collins class programs in one location.

WA has a highly skilled workforce and world-class training facilities

WA has a competitive, flexible, resilient and adaptable workforce, including workers already delivering Collins class Mid Cycle Docking. Our training facilities, including South Metro TAFE, are geared up for the future needs of the defence industry.

Significant infrastructure exists in WA with planning underway to enhance defence industry capability

The Australian Marine Complex is a world-class centre of excellence for the defence industry. This will be enhanced by the AMC Strategic Infrastructure and Land Use Plan to ensure Defence's needs are met.

Defence West

Defence West was established by the Western Australian Government as part of its Plan for Jobs. Its role is to grow the local defence industry and help deliver what Defence needs.

Our State's location is a strategic strength and serves as a gateway to the Indian Ocean region and emerging international defence markets.

Western Australia has the capability and capacity to contribute more to Defence in the national interest.

Department of Jobs, Tourism, Science and Innovation
1 Adelaide Terrace East Perth WA 6004
Tel: +61 8 9222 0555 | defencewest@jtsi.wa.gov.au
www.jtsi.wa.gov.au/defence-west

Welcome by President of the SIA - Mark Sander

Welcome to the 5th Submarine, Science, Technology and Engineering Conference. This year we are back in Western Australia but with the first instance it being a SubSTEC and our plan is the SubSTEC series of conferences will alternate between Fremantle and Adelaide, every second year. Fremantle has had a long history with submarines and, of course, WA is home to our submarine force located at HMAS Stirling.

This year's theme is "Innovation and Investment in the Sub-sea Environment". The SIA welcomes this opportunity to foster the exchange of ideas, the presentation of technical papers and, perhaps most important of all, the engagement of the submarine community from both home and abroad, together with those from the sub-sea environment from across the globe.

The Future Submarine Program is gathering momentum and a formal Government announcement on the Collins Class Life-of-Type-Extension program, appears imminent. The need to ensure a strong science, technology and engineering capability is critical to the success of these programs. This capability has the potential to cross-pollinate with the sub-sea industry which has a significant footprint here in Western Australia.

I would like to thank all of those who are participating in this conference with particular thanks to our Gold Sponsor – Defence West – and our many other sponsors. Without your support our annual conferences would not proceed.

Finally, I thank you all for your interest in, and support for, the SIA: I hope that you will enjoy the conference.

Warm Regards,
Mark Sander - President, SIA

MARK SANDER
PRESIDENT SUBMARINE INSTITUTE OF AUSTRALIA

Mark is a former submarine qualified senior Naval Officer. As a graduate of the Royal Navy's Submarine Command Course, 'Perisher'. Mark completed three tours of duty as a Submarine Commanding Officer, served on the Staff of the Commander Submarines Pacific as the RAN exchange officer and later as the Deputy Submarine Squadron Commander at HMAS Stirling.

Mark also served as the Commandant of the Royal Australian Naval College, he was responsible for all Navy new entry training (sailors and officers). This was followed by a posting as the Commandant of the ADF Warfare Centre responsible for Joint warfare training, doctrine and exercise management.

His defence postings to Canberra included Project Director for the New Submarine [Collins] Project Office and Director General Navy Safety and Certification. His latter service in the RAN included duties as the Director General for the Future Submarine Project and then as the lead for the Submarine Life Evaluation Program, the technical analysis of the Collins Class Submarines to determine the feasibility of a life extension.

His academic qualifications include an Executive Masters in Complex Project Management, an MBA in Technology Management and a Bachelor of Science in mathematics.

Mark is currently the Chief Operating Officer at Safran Electronics & Defense Australasia.

CDRE STEVE DAVIES RAN (Rtd)
MASTER OF CEREMONIES

Steve Davies is a senior consultant for Nova Systems, an Australian professional services company with expertise across Defence and other complex industries. He served for 30 years in the Royal Australian Navy, culminating in appointments as the Submarine Force Commander and Director General Submarine Capability. He was a consultant to the submarine industry for two years and has been a senior consultant and Operations Manager in Nova since 2015.

Steve was the Executive Director of the SIA until 2014 and previously part of a submarine design company and a work stream leader for the Collins Class Sustainment (Coles) Review. He was later part of John Coles' team for its progress review in 2014. As a senior consultant in Nova Steve was engaged to develop the Test Concept Document for SEA1000 Future Submarines Program and has been the Project Manager for Nova's work in BHP Billiton.

THE HON. LINDA REYNOLDS CSC
MINISTER FOR DEFENCE

I welcome you to the Submarine Institute of Australia 5th Submarine Science, Technology and Engineering Conference 2019.

As an island nation the security of our maritime approaches, the security of the region, the freedom of navigation, and the free flow of maritime trade must be protected. This means Australia's naval capability is a vital and enduring national interest.

With an estimated 300 submarines expected to be operating in the Indo-Pacific region by 2035, submarines are an important strategic capability for Australia.

With a rapidly evolving strategic environment where oceans are being contested, our Navy needs to be in more places at the same time, and be capable of responding as our region changes.

This is why the Australian Government is investing $90 billion in our Naval Shipbuilding Plan, including acquiring the larger Attack Class submarine force; setting the course to build and sustain current and new vessels for generations to come.

The Morrison Government is also maximising opportunities for local defence industry. We are building strong, trusted and reliable long-term industry partnerships – from research and development, to construction, sustainment and disposal.

To achieve our naval shipbuilding endeavour, Australian companies, who are becoming the best in the world, are producing high-quality equipment, advancing our technology edge, and creating career opportunities that will benefit the nation for generations to come.

Today we still have a world class capability provided by our fleet of six Collins Class submarines. The Collins Class submarine fleet is a highly capable conventional submarine and a critical component to our maritime presence. Important work is underway to maintain its potency through to the 2030's and beyond.

Information for Delegates to SubSTEC5 2019

Your Main Venue - The Esplanade Hotel Fremantle. Built in 1875, the building was known as 'Cranworth House'. After renovations, the Esplanade Hotel opened its doors in 1986. After major renovations to prepare for the defence of the 1987 America's Cup, the Esplanade assumed its current proportions. The hotel is now operated by Rydges and has recently undergone major renovations.

Social Events

There is a social event on each night of SubSTEC5. The Opening Reception will be held at the Fremantle Bathers Beach House on Monday 18 November. The major social event is the Conference Dinner, to be held in Orion/Pleaides on Tuesday 19 November with Pre-Dinner Drinks to be held in the Marine Lounge Bar from 1830-1900. The final event is a Networking Session in the Indian Ocean Suite from 1800-2000.

Mobile Phones

Please switch mobile telephones to silent to avoid disturbing speakers or other delegates. We do, however, suggest you use them to view the program and ask questions using Pigeonhole.

Chatham House Rule

While all content in the conference has been approved by the relevant organisations responsible for the speakers, the SIA applies the 'Chatham House Rule' to Questions and Answers: When a meeting, or part thereof, is held under the Chatham House Rule, participants are free to use the information received, but neither the identity nor the affiliation of the speaker(s), nor that of any other participant, may be revealed. In order to encourage the free exchange of ideas (within the bounds of security), please respect this rule.

SIA Membership

Membership of the SIA is open to all and is assigned to a named individual. For a Joining Fee of $55 which includes membership until the end of that Membership Year (July-June), members whose subscriptions are in date are entitled to special discounts at SIA Conferences and a regular newsletter with selections of relevant media articles and updates from the Institute. Sponsors of the SIA are able to assign complimentary memberships to varying numbers of their employees, dependent upon the level of support.

Delegates with full or discounted tickets are entitled to apply for membership of the SIA without a Joining Fee. All membership applications should be made on the online form on the SIA website and applications for complimentary membership under this Conference offer must be made by 31 December 2019.

Sponsorship

Sponsors are the lifeblood of the SIA and the money generated through corporate and conference sponsorship allows the SIA to carry out a range of activities to meet its objectives. Through their commitment to ongoing support, corporate sponsors fill a special place and, while the Institute remains completely independent of the commercial aims of its sponsors, their position is very highly regarded. Sponsorship of SIA Conferences is also very important and the recognition of those companies that have sponsored this conference is evidence of their value to the SIA. To become a sponsor, visit the SIA website under 'Sponsors'.

Hold the Date

The 10th Biennial SIA Conference 2020. The 10th Biennial SIA Conference 2020 (titled SIA2020) will be held in Canberra during the period 10-12 November 2020 at a venue to be announced. SIA2020 will feature senior and influential speakers from Government and Industry. Look out for messages about registrations and Call for Papers in around April 2020.

Discounts for SIA membership are at a maximum for those whose subscriptions are paid until 30/6/2021 by 1 May. The discount will then reduce to 50% until 31 July. Members whose subscriptions are brought up to date after 31 July 2020 will not receive any SIA membership discount.

SubSTEC6

The 6th SIA Submarine Science, Technology & Engineering Conference 2021. SubSTEC6 will be held in Adelaide in early-mid November 2021 at a venue to be announced.

SUBMARINE SCIENCE SubSTEC5 CONFERENCE 2019 TECHNOLOGY AND ENGINEERING

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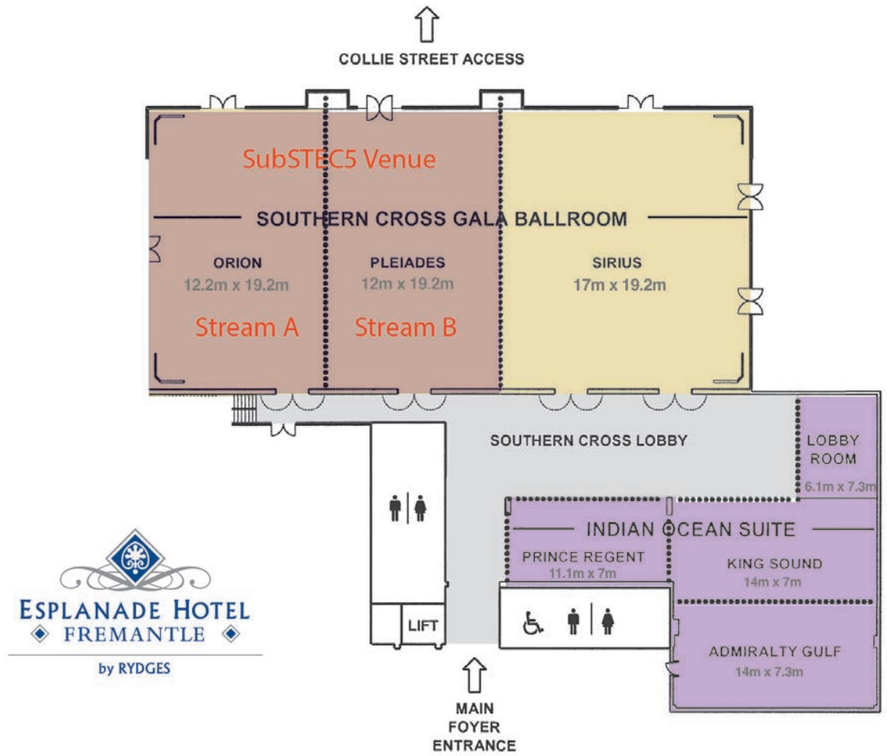
The floorplan shows where SubSTEC5 events will occur. Plenary Sessions on Tuesday and Wednesday morning will be held in the combined Orion/Pleaides rooms which will be separated for the subsequent streamed sessions:

Stream A in Orion, Stream B in Pleaides.

The Indian Ocean Suite will be used as the Breakout Area for session breaks and the Poster Paper Networking Session on Wednesday evening. If an emergency occurs, please follow instructions from hotel and conference staff.



CONFERENCE PROGRAM

TUESDAY 19th NOVEMBER 2019: SIA CONFERENCE DAY 1

07:30 - 08:15 **Registration & Refreshments:** Indian Ocean Suite

SESSION 1 - PLENARY SESSION (1)

08:15 - 08:30 **Opening Comments & Conference Administration:** Mark Sander, Steve Davies: Orion/Pleaides

08:30 - 08:50 **Welcome to Western Australia:** Hon Mark McGowan MLA - Premier of Western Australia

08:55 - 09:20 **The Relevance of Submarines and the Sub-Sea Environment to Australia's Strategic Situation:** RADM Mark Hammond AM RAN - Deputy Chief of Navy (representing Chief of Navy)

09:25 - 09:50 **The Future Submarine Program - An Update:** RADM Greg Sammut AO CSC RAN - General Manager, Submarines, CASG

09:50 - 10:00 **Questions & Answers:** Speakers from Session 1

10:00 - 10:30 **Morning Session Break:** Sponsored by: **BlueZone Group.** Indian Ocean Suite

SESSION 2 - PLENARY SESSION (2)

10:30 - 10:55 **Autonomy and the Future of Undersea Warfare:** Dr David Kershaw - Chief Maritime Division, DSTG

11:00 - 11:25 **Best Practices in IMMR And Life Extension in the Civilian Subsea Industry:** Mr Rex Hubbard - Chairman, Society for Underwater Technology, WA

11:30 - 11:55 **The French Connection:** General (Armement) Yannick Cailliez, Direction Générale de l'Armement (DGA), French Embassy

12:00 - 12:25 **Developing an Australian Submarine Museum:** Peter Horobin MBE - Lead, Australian National Submarine Museum

12:25 - 12:35 **Questions & Answers:** Speakers from Session 2

12:35 - 13:35 **Lunch Session Break:** Sponsored by **JFD Australia.** Indian Ocean Suite

SESSION 3

13:35 - 14:00 **State of the Union:** CAPT Doug Theobald CSC RAN - Commander, Submarine Force

14:05 - 14:30 **The View from the Opposition:** Hon Richard Marles, MP - Shadow Minister for Defence

14:35 - 14:45 **A Perspective on Submarine Issues and Opportunities:** Matt Moran - Executive Director, DefenceWest & Michele Clement - Director, Defence West Science Centre

14:45 - 14:55 **Questions & Answers:** Speakers from Session 3

15:00 - 15:25 **Afternoon Session Break:** Sponsored by **PGM Enviro.** Indian Ocean Suite

SESSION 4

15:25 - 15:50 **Collins Class Submarines - 'Challenges from the Waterfront':** CMDR Matt Butcher RAN - Class Lifecycle Engineering Officer, Submarine Force Headquarters

15:55 - 16:20 **SIA / IMarEST Synergies:** Doug Stevens, Chairman, IMarEST Victoria

16:25 - 16:45 **Presentation of Sponsorship Certificates:** Mark Sander - President, SIA

16:40 - 16:50 **Questions & Answers:** Speakers from Session 4

18:30 - 19:00 **Pre-Dinner Drinks:** Sponsored by **Defence sa.** Indian Ocean Suite

19:00 - 22:30 **Conference Dinner:** Sponsored by **Defence SA.** Panorama Ballroom
Dinner Wines: Sponsored by **Safran.**
Dinner Speaker: CDRE Bob Trotter OAM RAN Rtd. - President, Submarine Association of Australia. 'Fremantle Based WW2 Submarine Operations'

WEDNESDAY 20th NOVEMBER 2019: ROOMS 1 & 2

08:00 - 08:45 **21st Annual General Meeting of the Submarine Institute of Australia:** SIA Members only. Orion

08:30 - 09:00 **Single Day Registration & Refreshments:** Indian Ocean Suite

SESSION 5

09:00 - 09:25 **The use of 3D Imaging Techniques to Reveal the Wreck of HMAS AE1:** Andrew Woods, Manager HIVE, Curtin University

09:30 - 09:55 **Innovation and Investment in the Sub-sea Environment: A Case Study:** Ron Allum

10:05 - 10:35 **Morning Session Break:** Sponsored by **JEDS.** Indian Ocean Suite

SESSIONS 6-8 - GENERAL PRESENTATIONS

	STREAM 6A - SUBMARINE STRATEGIC CAPABILITIES AND SOVEREIGN SUSTAINMENT	STREAM 6B - SUBSEA EXPLORATION, SONAR DEVELOPMENTS & OCEANOLOGY
10:35 - 11:00	**6A-1** **Near-term Asian War: Impacts and Options for Australia's Submarine Program:** Keith Joiner, Senior Lecturer, UNSW, Canberra	**6B-1** **Everything you always wanted to know about Syntactic Foam* (*But were afraid to ask):** James Kingston - Technical Lead - Defence, Matrix Composites & Engineering
11:05 - 11:30	**6A-2** **Collins Class Submarines - Today to Life of Type Extension (LOTE):** Rodney Brown, Chief Engineer CCSM, ASC	**6B-2** **Simple Description of Seafloor for Sonar Performance Estimates in Shallow Oceans:** Adrian Jones - Honorary Fellow, Defence Science and Technology Group
11:35 - 12:00	**6A-3** **Maritime Training Range Status and Technology:** Peter Yinger - Director, L3 Technologies MariPro	**6B-3** **Ping Stealing for Multistatic Sonobuoy Processing:** Stephen Brown, Senior DSP Engineer, Sonartech Atlas Pty Ltd
12:05 - 12:30	**6A-4** **Ensuring the Future Submarine Program – A Systems Engineering Governance Approach:** Quoc Do - Systems Engineering Governance Manager, Future Submarine Program (FSP)	**6B-4** **Designing Ships for Deep Sea Mining:** Govinder Singh Chopra - SeaTech Solutions International (S) Pte Ltd
12:30 -12:40	**Questions & Answers:** Speakers from Session 6A	**Questions & Answers:** Speakers from Session 6B

12:35 - 13:35 **Lunch Session Break:** Sponsored by **HTR Group.** Indian Ocean Suite

	STREAM 7A - SUBMARINE STRATEGIC CAPABILITIES AND SOVEREIGN SUSTAINMENT	STREAM 7B - SUBSEA EXPLORATION, SONAR DEVELOPMENTS & OCEANOLOGY
13:40 - 14:05	**7A-1** **Models and Choices for Submarine Acquisition and Construction Programmes:** Hans Egonsson - Program Manager, FMV	**7B-1** **Methods and technologies for improving the performance of submarine launched bathymetric probes:** Darren Burrowes - Chief Technology Officer, BlueZone Group
14:10 - 14:35	**7A-2** **Mid-Life Upgrade of the Swedish Gotland Class Submarines:** Toby Lemerande - Head of Discipline - Asset Management, BMT D&T	**7B-2** **The Subsea Soundscape off Western Australia:** Yong Zhang - Senior Research Scientist, Defence Science & Technology Group
14:40 - 15:05	**7A-3 Introducing Electrohydrostatic Actuation on Underwater Vehicle:** Xavier Sebastiani - Sales & Application Engineer, Moog Australia	**7B-3** **How to train a sonar classifier using YouTube:** Jeremy Eastham - Junior Engineer, Sonartech Atlas Pty Ltd
15:05 - 15:15	**Questions & Answers:** Speakers from Session 7A	**Questions & Answers:** Speakers from Session 7B

15:15 - 15:45 **Afternoon Session Break:** Sponsored by **xxx.** Indian Ocean Suite

WEDNESDAY 20th NOVEMBER 2019: ROOMS 1 & 2

SESSIONS 6-8 - GENERAL PRESENTATIONS

	STREAM 8A - SUBMARINE TECHNOLOGIES & AUTOMATION	STREAM 8B - SYSTEMS ENGINEERING, ROBOTICS & AUVS
15:45 - 16:10	**8A-1** **The Use of Actively Controlled Anodes in Free Flood Space to Minimise Corrosion Related Signature from Submarine Platforms:** Andrew Davis, Technology Manager - EM Signatures, Ultra Electronics - PMES	**8B-1** **Quantum Clocks and Magnetometers:** Piers Lincoln - Institute Manager, IPAS
16:15 - 16:40	**8A-2** **Benchmarking Electric Actuation for Submarine Masts against Hydraulic System:** Bryon Calder, Research & Development Engineer, MacTaggart, Scott & Co. Ltd.	**8B-2** **Development of an advanced five-function robotic manipulator arm for sub-sea remotely-operated vehicles:** Anders Ridley-Smith - Business Development Manager, BluePrint Lab
16:45 - 17:10	**8A-3** **Breaking The Cycle Of Submarine Cable Failures and Enabling Future Systems through Optical Fibre Architecture:** Glen Richardson - Chief Technical Officer, Scientific Management International	**8B-3** **Trajectory Planning for Dynamic Autonomous Underwater Vehicle Docking:** Karl Sammut - Director, Centre for Maritime Engineering, Flinders University
17:10 - 17:20	**Questions & Answers:** Speakers from Session 8A	**Questions & Answers:** Speakers from Session 8B

18:00 - 20:00 **Poster Paper Networking Session:** Sponsored by **BMT.** Indian Ocean Suite

THURSDAY 21st NOVEMBER 2019: SIA CONFERENCE DAY 2

08:30 - 09:00 **Single Day Registration & Refreshments:** Indian Ocean Suite

SESSIONS 9-11 - GENERAL PRESENTATIONS

	STREAM 9A - SUBMARINE TECHNOLOGIES & AUTOMATION	STREAM 8B - SUBSEA INDUSTRY, WORKFORCE, TRAINING, CERTIFICATION & CLASSIFICATION
09:00 - 09:25	**9A-1** **Outboard Submarine Cable Design and Construction:** Mark Hendry - Hydrogroup plc	**9B-1** **The Technology Revolutionising Welder Training in the Subsea Industry:** Geoff Crittenden - Chief Executive Officer, Weld Australia
09:30 - 09:55	**9A-2** **Automation technologies and their impact on submarine control:Rebecca Brickhill, A26 Automation Lead Engineer, Saab Group.**	**9B-2** **Innovative training and R&D in Subsea technologies and engineering at the University of Adelaide:** Eric Fusil - Director of Shipbuilding Hub for Integrated Engineering and Local Design, University of Adelaide
10:00 - 10:25	**9A-3** **ARTAM - Adaptive Real-Time Alert Management System:** Professor Peter Goldschmidt - The University of Western Australia, ALERT-KM Pty Ltd	**9B-3** **Creating a skilled, sovereign workforce for submarine construction and sustainment:** Ian Irving - Chief Executive, Naval Shipbuilding Institute
10:25 - 10:30	**Questions & Answers:** Speakers from Session 9A	**Questions & Answers:** Speakers from Session 9B

10:35 - 11:05 **Morning Session Break:** Sponsored by **APC Technology.** Indian Ocean Suite

	STREAM 10A - SUBMARINE TECHNOLOGIES & AUTOMATION	STREAM 10B - SUBSEA INDUSTRY, WORKFORCE, TRAINING, CERTIFICATION & CLASSIFICATION
11:05 - 11:30	**10A-1** **Specifying and Evaluating Real World Main Storage Battery Performance:** Larry Scuteri - Senior Engineer, PMB Defence Engineering	**10B-1** **Risk-Based Marine Certification:** Simon Di Nucci - Senior Safety Consultant, Frazer-Nash Consultancy
11:35 - 12:00	**10A-2** **Li-ion batteries for conventional submarines:** Anders Wikstrom - Project Manager, Saab Kockums.	**10B-2** **Protecting Sovereign Capability: Tackling Drugs and Alcohol for Sub-sea Industries from Design to Sustainment:** Mario McDonagh - Marketing Director, Screening On Site
12:05 - 12:30	**10A-3** **Open Systems - A Panacea?:** Mark Lankester - Systems Engineering Manager, Atlas Elektronik UK	**10B-3** **Fleet Life Cycle Management:** Tobias Lemerande - Senior Sustainment Manager, BMT
12:30 - 12:40	**Questions & Answers:** Speakers from Session 10A	**Questions & Answers:** Speakers from Session 10B
12:40 - 13:40	**Lunch Session Break:** Indian Ocean Suite	
	STREAM 11A - SUBMARINE TECHNOLOGIES & AUTOMATION	**STREAM 11B - SUBMARINE ESCAPE & EMERGENCY**
13:40 - 14:05	**11A-1** **Benefits of unconventional cross-industry engagement in the submarine environment:** Amy Fernandes - Graduate Mechanical Engineer, ASC Pty Ltd	**11B-1** **Switching from inboard vented to non-vented submarine tower escape based on submarine angle:** Dominic Cosserat - SMERAS Systems Engineer, QinetiQ Ltd
14:10 - 14:35	**11A-2** **Bridging the Underwater Communications Gap:** Scott Elson - Chief Technology Officer, L3Harris	**11B-2** **Predicted effect of ascent rate on probability of decompression sickness in submarine tower escape:** Joel Edney - Research Scientist, QinetiQ Ltd
14:40 - 15:05	**11A-3** **Saving Time Saves Lives:** Toff Idrus, OAM - Managing Director, JFD Australial	**11B-3** **Benefits of Upgrading Escape Systems:** Andreas Koelsch, Escape Systems Engineer, thyssenkrupp Marine Systems GmbH
15:05 - 15:15	**Questions & Answers:** Speakers from Session 11A	**Questions & Answers:** Speakers from Session 11B
15:20 - 15:30	**CLOSING REMARKS -** Mark Sander - President, Submarine Institute of Australia	
15:30 - 15:40	**Afternoon Session Break:** Indian Ocean Suite	

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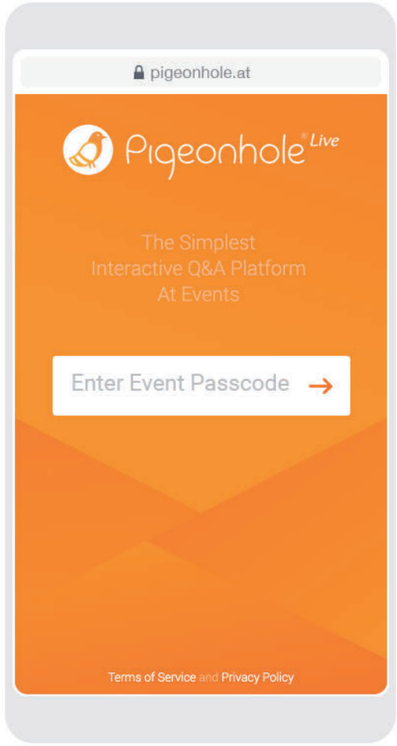
Pigeonhole
Your resource for the Program & Questions

For this conference, the SIA has set up Pigeonhole. This is an online system that you access via your internet-enabled device.

To start, open up a web browser and enter **www.pigeonhole.at** or just scan this QR code:



Once you see this site, enter the Event Passcode:

SUBSTEC5

It's not case-sensitive.

You will see the Program. Some sessions are for information such as Session Breaks and Lunch, others are conference sessions where you can ask a question. Tap on any session with a question mark and you can see who will be speaking, their biography and, where it has been provided, an abstract of the presentation.

At any stage until the end of that session, you can ask a question by tapping the orange bar marked 'Enter this Q&A'.

You can be anonymous or you can sign in with as much or as little information as you feel comfortable disclosing.

You can either enter your question or, if others have already asked that (or a similar one), you can vote for it. The questions will be put to the presenter in order of the number of votes cast.

Your involvement doesn't stop there. You can also rate how well you feel the questions have been answered (and not just yours).

Pigeonhole also hosts a survey so you can provide feedback about the conference while it's fresh in your memory and it will also be used to broadcast alerts to all delegates.

If you're concerned about your battery life, Pigeonhole assures us that the program is designed to minimise the effect on energy consumption.

PMB DEFENCE

Our sponsors for Pigeonhole this year are PMB Defence, South Australian-based and long-standing suppliers of submarine batteries. You can read more about them on their page accessible from any of the conference web pages (except the Program).

SIA Position Statement

The following constitute a Position Statement held by the SIA Committee:

Sustainment of Submarine Capability

Sustainment of Australia's submarine capability and enhancement of that capability over time is regarded as a fundamental priority of Australian national security policy and investment. Such investment should embrace and enhance both the numbers of submarines and their individual capability.

Capability Enhancement in Concert with ADF Major Force Elements

The enhancement of Australia's submarine force should be progressed in conjunction with enhancement of other major Australian Defence Force elements, including full consideration of manned and unmanned vehicles and the necessary command, control, communications, sensors/weapons/processing and intelligence networking essential for the effective application of military force.

Primary Focus on the Submarine Workforce

The primary enabler of the submarine force capability is the workforce who design, construct, operate and sustain the submarines and their supporting elements. Development of the submarine capability must always consider the needs and expectations of the people in the submarine workforce together with their immediate families and colleagues.

Flexible and Proactive Development of Doctrine, Tactics and Systems

The development of undersea doctrine, tactics and systems is a continuous process that must be acknowledged and fully supported through sustained investment and experimentation.

Support for Research, Development, Test and Evaluation

The collaborative research, development, test and evaluation in the undersea warfare domain must be progressed in collaboration with academia and with other allied and partner countries and organisations. The Submarine Science, Technology and Engineering Conference Series is focussed expressly on this important role.

Some Frequently Asked Questions about Submarines and the Future Submarine Program

What are the unique characteristics of submarines?

- They are able to operate undetected in areas far away from their home base for long periods of time.
- They exploit the advantage of surprise:
  - *Able to gather a wide range of information while unobserved.*
  - *Able to operate in areas where Australia may not control the sea and air.*
  - *Able to wait undetected then deliver a very powerful punch when ordered.*
  - *Demand highly disproportionate effort to counter the threat they represent.*
- They deliver a very powerful effect from comparatively small numbers of people.

Why does Australia need submarines?

"...Our home is girt by sea.." Submarines are part of the balanced maritime force that our maritime nation requires to deter would-be aggressors and to build Australian influence.

- Our national prosperity depends on continued access to the sea.
- History has taught us the effectiveness of submarines in Australia's defence:
  - *1942 to 1945: Over 150 US, British and Dutch submarines operating from Australia cut invading forces' supply lines throughout our region.*
  - *Post 1970s: Australian submarines conducted unique surveillance activities.*
- Allows Australia to play to its strengths:
  - *A small number of smart people undetected, packing a powerful punch at great distance from Australia.*

Why does Australia need 12 submarines?

- Submarine warfare is essentially a war of probabilities ancertainty.
  - *Australia seeks to minimise the probability that its submarines are detected and maximise the effort required of an aggressor to combat them*
- Be able to sustain at least 3 submarines on patrol to maximise uncertainty.
- Need 3 - 4 submarines for every 1 on patrol = 12

How can we crew 12 submarines?

- Submarines are inherently efficient in crewing terms; only one third the crew size of a frigate.
- Navy recognises the need to attract more people to serve in submarines.
- Navy is implementing a significant development program for the submarine workforce.
- Recently announced plans to base at least some of the Attack class submarines on the East Coast will broaden the recruiting base.
- With effort and priority there is no reason why there will not be sufficient crews for 12 submarines in the future Navy.

Why diesel-electric submarines?

- The Collins program has shown:
  - *Australia has the capacity to build large world class conventional submarines, and That these boats meet Australia's unique requirements*

Why not nuclear powered submarines?

- Nuclear-powered submarines would provide the mobility and endurance needed to optimise Australia's submarine capability.
- Australia does not yet have the scientific and industrial infrastructure nor the political will to build and support nuclear submarines.
- The cost of establishing a nuclear industry for submarine systems in advance of its adoption for national energy and environmental purposes cannot be justified.
- Why was a new submarine design selected for the Future Submarine?
- The Government's 2016 Defence White Paper identified specific requirements for Australia's Future Submarine. As was our experience with the Collins class submarines, only a new design built for the range, endurance and capability that Australia's geography dictates will deliver on these requirements.

Why should we build the submarines in Australia?

- Because undersea warfare is essentially a war of probability and uncertainty, a capacity to repair and replace submarines in operation reduces the impact of attrition and increases the effort required of an aggressor to guarantee that it has removed all Australian submarines from its path.
- The build program will develop the capacity and quality of marine and electronics engineering and systems integration in Australia.
- Submarines built in Australia will have the potential for more effective supportability and better adaptability for emerging Australian requirements.
- Australia can undertake the building and systems integration at the time of our choosing and can continue it indefinitely into the future. In time of national emergency, the building program could be accelerated or even duplicated.

Where is the money going to come from?

- The build program will be spread over many years representing a balanced proportion of the planned Defence budget (<20% of annual capital equipment).
- A very high percentage of the expenditure will go to employment and further research and development here in Australia, and this will contribute to a dynamic economy.

What are the economic benefits of the Future Submarine to Australia?

- The Future Submarine program will be a nation-building undertaking of a similar magnitude and significance to the Snowy Mountains hydro-electric scheme or the North West Shelf program.
- The Collins program generated several thousand jobs, new skills and, above all else, engendered the confidence and competence to take on the Future Submarine program.
- Analysis of more recent major Australian naval programs indicates that every $10 million that Defence spends on an Australian-built Future Submarine would generate:
  - *~$19.5 million in national output.*
  - *~102 Australian jobs per annum.*
- Much of this benefit comes from engagement of sub-contractors and suppliers in Australia to support a local build. These subcontractors and suppliers, in turn, engage local suppliers. An offshore build would have had a significantly lower economic benefit.

The Submarine Institute of Australia supports or promotes informed discussion and research in the fields of submarine operations, engineering, history and commercial sub-sea engineering - otherwise known as submarine matters.

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