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**How can Australian academia and
industry provide a capability edge?**



**6th SUBMARINE SCIENCE, TECHNOLOGY
& ENGINEERING CONFERENCE 2021**



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Welcome by President of the SIA - Mark Sander

Welcome to the 6th SIA Submarine Science, Technology and Engineering Conference 2021 (SubSTEC6).

Last year I referred to 2020 as being like no other in recent times. Perhaps 2021 has even been more challenging with Covid – 19 affecting the very nature in how we live our lives. Lockdowns, masks and check in apps have become a way of life. We have however learned to co-exist with these challenges and once again the SIA has conducted our annual conference using the hybrid model. Hopefully we have learnt from last year's experiences and are able to build on last year's successful conference.

Our theme of "Home grown undersea technology: how can Australian academia and industry provide a capability edge?" was selected early this year with a focus on developing our sovereign capability. The SIA firmly believes, and wholeheartedly supports, that the path to regional superiority is through the development of our domestic capability. Government, Defence, Industry, Academia and the Scientific Community must work together if this capability is to be realised. I am sure that we will hear about numerous examples where Australian capability has been developed and is already making a difference to our submarine capability.

2021 has also been significant for reasons other than Covid – 19. The Federal Government's decision to enter a trilateral security partnership with the United Kingdom and the United States, known as AUKUS, is a historic and momentous decision. The first initiative under AUKUS will be to acquire nuclear-powered submarine technology, leveraging decades of experience from the US and UK to deliver at least eight nuclear-powered submarines for Australia. Over the next 18 months, Australia, the UK and US will intensely examine the full suite of requirements that underpin nuclear stewardship and demonstrate a clear pathway to becoming a responsible and reliable steward of this sensitive technology. A Nuclear-Powered Submarine Taskforce in the Department of Defence is led by VADM Mead.

Finally, I would like to thank all of those who are participating in this conference, especially our key speaker, the Minister for Defence Industry, Honourable Melissa Price MP. Once again, due to the travel restrictions, many of our speakers will be joining online. I must also thank all our sponsors, without who we would not be able to conduct this important work.

I thank you for your support of the SIA and trust you enjoy the conference

Regards, Mark Sander



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.

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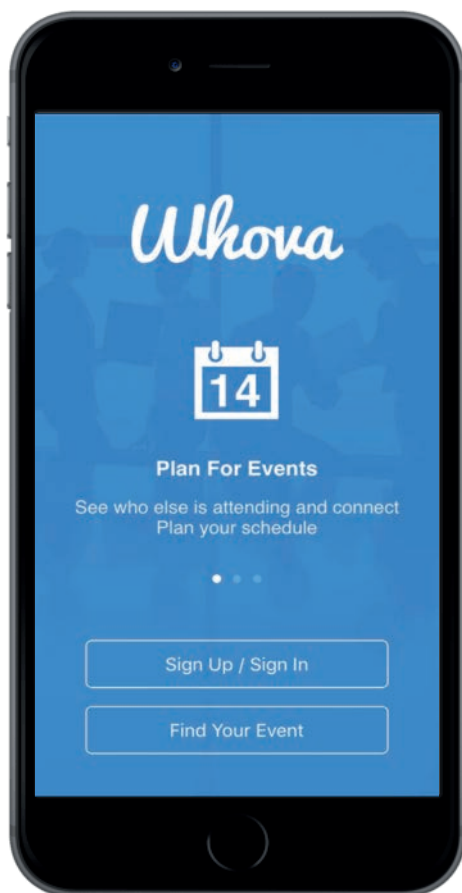
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SubSTEC6 Conference Program



07:30 - 08:15 **Registration & Coffee**

SESSION 1 - SubSTEC6 Launch – Plenary - Panorama 1 & 2

- 08:15 - 08:30 **Welcome, Opening Comments, Admin:** CDRE Steve Davies RAN Rtd. (MC), CDRE Mark Sander RAN Rtd. – President SIA and Rebecca Brickhill – SIA Substec 6 Chair
- 08:30 - 08:45 **Welcome to South Australia:** Hon Steven Marshall MP – Premier of South Australia
- 08:45 - 09:15 **Keynote Address:** Hon Melissa Price MP – Minister for Defence Industry

SESSION 2 - Setting The Scene - Plenary

- 09:15 - 09:45 **State of the Union:** CDRE Tom Phillips, Director-General Submarines, RAN, ADO
- 09:45 - 10:15 **Collins Class LOTE:** CAPT Dan LeRaye RAN – Executive Director Collins Class LOTE- RAN

10:15 - 10:45 **Break**

SESSION 3 - Technology Innovation & Transition in Submarine/Undersea Warfare (USW) Science, Technology & Engineering - Plenary

- 10:45 - 11:15 **Technology Innovation and Transition in Australia:** Catherine Foley PhD AO PSM, Australia's Chief Scientist
- 11:15 - 11:45 **Defence Strategy for Innovation, Science and Technology:** David Kershaw PhD, Chief Science Engagement & Impact, DSTG, ADO
- 11:45 - 12:15 **Defence Innovation and Industry :** Andrew Hodgkinson, Centre for Defence Industry Capability
- 12:15 - 12:45 **ADO & Academia – Collaborative R&D – Innovative Maritime Programs:** Michael van Balen AO, Principal Australian Maritime College, UTAS
- 12:45 - 13:15 **Superior Sovereign Capability - Some Perspectives:** Mr Paul Gay, Chief Operating Officer ASC

13:15 - 14:00 **Lunch**

SESSION 4 - Tuesday 9 November 2021 – Day 1 - Science & Technology

		Title	Presenter		Title	Presenter
14:00 - 14:30	4A-1	Maritime Industry Research Past, Present & Future – Collaborations between Academia and Industry	Prof Johnathan Binns Australian Maritime College, UTAS	4B-1	Remote Undersea Surveillance STaR Shot	Dr Sam Davey DST Group, ADO
14:30 - 15:00	4A-2	Partnering to develop a world-class Hydrodynamics Capability for Australia	Prof Martin Renilson UTAS/Pacific ESI	4B-2	Prospects for Submarine Detection with High Frequency "Over-The-Horizon-Radar"	Prof Stuart Anderson University College London
15:00 - 15:30	Break					
15:30 - 16:00	4A-3	Sovereign Submarine Research Capability for Near Free Surface Hydrodynamics	Alexander Conway Australian Maritime College, UTAS	4B-3	Control System Integration in Underwater Vehicles for Complex Intervention	Peter Davis, Saab Anders Ridley-Smith Blueprint Lab
16:00 - 16:30	4A-4	An International Collaboration Benchmarking Target Echo Strength Theoretical Prediction Models and measurements on Scaled Submarine Shapes	Dr Nadine O'Brien DSTG, ADO	4B-4	ASW Sensors and the Internet of Things (IoT)	Horde Wiltshire Acacia Systems)

SESSION 5, 6 & 7 - Tuesday 9 November 2021 – Day 1 – Plenary- Panorama 1&2

Session 5	16:30 - 17:00	The View from the Opposition (Remote): The Hon Brendan O'Connor MP. Shadow Minister for Defence
Session 6	17:00 - 17:15	Sponsor Recognition: Rebecca Brickhill – SIA
Session 7	18:30 - 19:00	Pre-Dinner Drinks Student Poster Competition - Presentation of Prizes: Rebecca Brickhill – SIA

SESSION 8- Wednesday 10th November – Day 2 – Science & Technology

Session 8-1	08:45 - 09:00	Welcome, Opening Comments, Admin: CDRE Steve Davies RAN Rtd. (MC)and Rebecca Brickhill . – SIA
Session 8-2	09:00 - 09:30	Gold Sponsor's Address: Gary Hale – WA Defence Advisory Forum Representative

		Title	Presenter		Title	Presenter
09:30 - 10:00	8A-3	Risk Management for Emerging Submarine Technologies	Mick Warren John Viskic Frazer-Nash Consultancy	8B-3	Towards Undersea Operations of a Quantum Magnetometer for Undersea Surveillance	Dr Chris Perrella University of Adelaide
10:00 - 10:30	8A-4	An Integrated Framework for Evaluating the Opportunities in Developing and Maintaining Australian Leading-Edge Submarine Capabilities	David Brown Systems Planning & Analysis Australia Pty Ltd	8B-4	Lighting the Way – Operational Autonomy for Submarines Using Distributed Fibre-Optic Sensing and Prescriptive Analysis	Dr John Arkwright Arkwright Technologies

10:30 - 11:00 **Break**

SESSION 9- Wednesday 10th November – Day 2 – Science & Technology

11:00 - 11:30	9A-1	Next-Generation Integrated Photonic Sensors for Underwater Communications, Navigation & Awareness	Prof Warwick Bowen University of Queensland	9B-1	Assessing Space Requirements of Future Submarines at the Design Stage	Dr Francois Fraysse Dr Peter Schumacher University of South Australia
11:30 - 12:00	9A-2	Diamond-Doped Optical Fibres for Remote Undersea Magnetometry	Prof Brant Gibson RMIT University	9B-2	Designing Submarine Habitable Spaces for Increased Productivity and Wellbeing	Prof Siobhan Banks Dr Raymond Matthews University of South Australia
12:00 - 12:30	9A-3	Recommendations for Sonar Tank Design and Low Frequency Behaviour	Dr George Raicevich Sonartech Atlas Pty Ltd	9B-3	Optimising Submarine Sleeping Berths: Impact of Bunk Orientation and Motion on Sleep and Cognitive Performance	Prof Siobhan Banks Dr Raymond Matthews University of South Australia

12:30 - 13:30 **Lunch**

SESSION 10- Wednesday 10th November – Day 2 – Science & Technology

13:30 - 14:00	10A-1	Underwater Networks for Connecting Robotic Autonomous Systems	Alessandro Ghiotto L3Harris Technologies	10B-1	The Australian Research and Experimental Submarine (ARES) Program	Prof Eric Fusil University of Adelaide
14:00 - 14:30	10A-2	Scrambled Direct-Sequence Spread-Spectrum Underwater Acoustic Communication System	Prof Peng Chen Curtin University	10B-2	Emerging Technologies to Support Noise Reduction in Submarine Systems	Norman Voss IMI Critical Engineering

14:30 - 15:00 **Break**

SESSION 11- Wednesday 10th November – Day 2 – Science & Technology

15:00 - 15:30	10A-3	A High-Rate Reconfigurable Underwater Acoustic OFDM System Based on USRP and Python	Prof Yue Rong Curtin University	10B-3	Real-World Advice for Maximising Australia's Submarine Main Storage Battery Capability	Greg Carmody Pacific Marine Batteries Defence
15:30 - 16:00	11A-1	Feasibility of a Multi-Function Electronically Steered Array for Electronic Support and Communications in a Submarine Environment	Dr Adrian Sutinjo Curtin University	11B-1	New Generation of Active Antifouling Coatings for Preventing Marine Growth	Prof Mats Andersson Flinders University

Session 12-1 16:00 - 16:20 **Closing remarks:** Rebecca Brickhill – SIA



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Information for the Delegates to the 6th Submarine Science, Technology & Engineering Conference 2021

Your Venue - Adelaide Convention Centre.

The ACC was the first purpose-built convention centre in Australia. The convention centre was designed by John Andrews and constructed over part of the Adelaide railway station, together with the Hyatt Regency Hotel (now the InterContinental Hotel), Exhibition Hall and an office block in the 1980s as part of the Adelaide Station and Environs Redevelopment (ASER) project.

The floorplan below shows the Panorama area in which the Conference will be held as well as the Reception and Pre-Dinner Drinks. The Dinner will be held in Riverside.

On the afternoon of Day 1 (Tuesday), the conference will break into two streams:

Stream A in Rooms P1 and P2;

Stream B will be in Room P1.

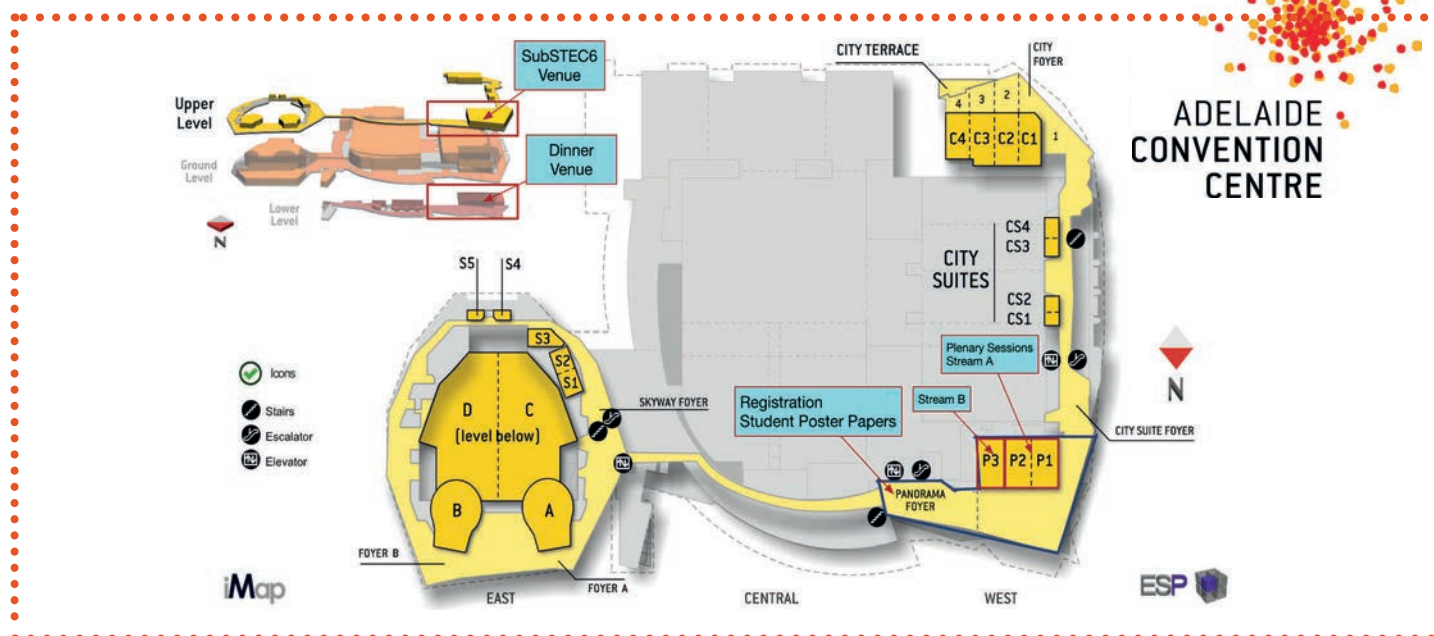
Internet

There is free Conference WiFi (ACC_FREE) but it has limited data. You may prefer to use your own data for privacy and security reasons as well as speed.

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 2021.



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 Whova.

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 his rule.

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