

# FROM COLLINS TO SSN

7TH SUBMARINE SCIENCE, TECHNOLOGY & ENGINEERING CONFERENCE 2023



ADELAIDE CONVENTION CENTRE • 18 - 20 SEPTEMBER 2023

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## Submarine Institute of Australia 7<sup>th</sup> Submarine Science, Technology and Engineering Conference (SubSTEC7) 18-20 September 2023 Adelaide Convention Centre

### CALL FOR PAPERS

The Report to Government by the Nuclear Powered Submarine Task Force, in March of this year, will address the acquisition by Australia of nuclear-powered submarines. The transition from COLLINS Class to nuclear powered attack submarines (SSN) will be a demanding and complex endeavour requiring a radical shift in strategic planning for the future Australian submarine force.

The Submarine Institute of Australia ([SIA](#)) SubSTEC7 (18-20 September 2023, Adelaide Convention Centre) will focus on the unique and unprecedented challenges associated with this transition.

The SIA invites Australian and international government agencies, maritime academic research and industry organisations to participate in the conference and to contribute papers aligned with the conference theme of:

### *From COLLINS to SSN*

A wide range of challenging factors are associated with the introduction of nuclear-power technologies especially as Australia lacks a nuclear power industry.

Similarly, the time available to undertake this fundamental transition is constrained by the overriding need to avoid any 'Capability Gap' in submarine availability.

This conference focuses on the full spectrum of sovereign and international academic and industrial collaboration and support required to transition from an Australian submarine capability based on the Collins Class submarines to a capability requiring the ability to acquire and sustain an Australian nuclear-powered submarine force. This mandates the education, training and qualification of scientific, technological, regulatory industrial and uniformed workforces, the building up of the infrastructure to internationally approved safety and security standards, the identification and qualification of a range of suppliers and service providers covering the complete supply chain, and the agreement with source countries for access to intellectual property, sub-assemblies, components, nuclear fuel and raw materials needed for the full life cycle of the SSN.

A further requirement, not previously encountered by Australian Defence is the responsibility for the full nuclear fuel cycle from initial supply through ultimate reprocessing of spent fuel and disposal of residual radioactive wastes.

#### **The participation we seek for the conference includes:**

- Australian and International submarine enterprise participants - government, industrial and academic – engaged in the full technical architecture to design, construct, support and operate an Australian nuclear-powered submarine force.
- Nuclear regulators and/or organisations who support the design of regulatory systems.
- Australian and International shipbuilding and repair organisations
- Maritime materials organisations involved in nuclear-powered submarine construction and sustainment.

- Organisations involved in nuclear fuel production, storage, transportation, and waste management.
- Organisations involved in undersea warfare technologies, including future conventional weapons systems and uncrewed vehicles capable of being employed in Australian submarines.

The SIA is seeking proposals for previously unpublished papers which predominantly address the Science, Technology and Engineering opportunities and challenges associated with securing and projecting power from the undersea domain. Papers may focus on challenges and opportunities related to sustaining and enhancing Collins, transitioning to and operating SSNs or other technologies that primarily operate from or secure the undersea domain.

This first call is for abstracts of up to 250 words that summarize the proposed papers. These will be reviewed then authors of selected abstracts will be invited to submit full papers in the prescribed template format for peer-review. Review comments will be provided to the author who must register for live attendance at the conference. Final camera-ready papers will then be required by a deadline sufficient for printing of the proceedings to be available before the conference. Authors will also be invited to provide PowerPoint slides to be used for oral presentation of their paper. Poster presentation will also be possible. Registration fees for attendance at the conference (but not the social and other events) will be waived for one person to present each paper.

## Timeline for Technical Papers

The following is the required timeline for submission of abstracts, papers and presentations:

Activity	Responsible	Duration	Deadline 2023
<i>Issue Call for Papers</i>	SIA	0	02 February
Abstracts submitted	Author	9 weeks	6 April
<i>Invitation for papers for selected abstracts</i>	SIA	2 weeks	20 April
Draft papers submitted in template format	Author	6 weeks	1 June
<i>Review completed and comments to authors</i>	SIA	4 weeks	30 June
Primary author registered for conference	Author		30 June
Final camera-ready papers submitted	Author	4 weeks	27 July
Presentation slides submitted	Author		18 August

## Authors' Files

Abstracts of not more than 250 words should be submitted in .docx format to the [Jot-Form link](#) following the timeline above.

Technical papers will be published in the Conference Proceedings and it is mandatory that the conference [template](#) is used.

Presentations should be prepared in MS PowerPoint and set up in 16:9 format (widescreen).

## Potential streams and examples of topics for papers:

### Stream 1. Sustaining and Enhancing Collins

- COLLINS Class Life of Type Extension (LOTE)
- COLLINS Hull, Mechanical & Electrical (HM&E)
- Combat System and weapons

- Evolving and new technology that could be introduced to enhance Collins capability, operations, and sustainment
- Using COLLINS to trial new technology ahead of introduction of SSNs

### **Stream 2. The journey from a conventional to a nuclear submarine force**

- Fleet interoperability – How our surface fleet will operate with SSNs
- Challenges to operating 2 classes of submarines concurrently – workforce, infrastructure, supply chain, training etc
- Maintaining a Submarine Escape and Rescue capability
- Building / reskilling the workforce on nuclear safety, security and quality.
- Collaboration across industry and academia with US and UK
- Challenges from US technology export controls including ITARs

### **Stream 3. Nuclear Fuel Cycle**

- Compliance with Nuclear Non-Proliferation Treaty (NPT)
- More challenges in use of highly enriched uranium (HEU) nuclear fuel
- Interaction with International Atomic Energy Agency (IAEA)
- Establishment of nuclear submarine regulatory regime and licensing policy
- Supply chain for nuclear fuel to Australia
- Management of spent nuclear fuel – reprocessing, disposal of residual radioactive waste.
- Ole of ANSTO, ARPANSA and other Australian nuclear organisations

### **Stream 4. Implications for the Australian community of going nuclear**

- Building a social licence – reassuring the public nuclear powered submarines can be run safely
- Infrastructure implications to build, sustain and operate nuclear powered submarines
- Need for a land-based or barge-based nuclear submarine reactor for training and technical support.
- Safety case development
- Regulatory requirements for Australian SSNs
- Assurance, verification, and validation
- Embedding a nuclear mindset
- Security of US nuclear submarine technology.

### **Stream 5. Evolving undersea technology**

- Role of uncrewed underwater vehicles (UUV) in ISR, tactical engagement and other tasks
- Extra-large UUV (XLUUV) development and concept of operations
- Advances in quantum underwater communications
- Applying Artificial Intelligence (AI) in submarine operations, sustainment and evolutions
- Battery technology development for safety-critical applications
- Underwater surveillance and classification by acoustic and non-acoustic sensor
- Maritime cyber security