ACCELERATING THE ADVANTAGE

QUEENSLAND DEFENCE SCIENCE ALLIANCE

DEFENCE INNOVATION NETWORK

Information Briefing – Quantum Sensing for Extreme Environments

17 June 2025

Outlook Industries - Ground Uncrewed System (GUS)

Agenda

- Opening remarks
- Background
- Theme & Topics
- Conditions
- Collaboration
- Evaluation
- Applications
- Questions

QDSA-DIN Quantum Sensing Grant 2026

Guidelines

1. Background and Purpose

1.1 The QDSA-DIN Quantum Sensing Grant is designed to strengthen national collaboration and enhance research and development capabilities within Australia's defence sector. Jointly delivered by the Queensland Defence Science Alliance (QDSA) and the NSW Defence Innovation Network (DIN), the program promotes cross-institutional and cross-state partnerships by connecting researchers from QDSA and DIN member universities to co-develop innovative solutions aligned with Defence's Innovation, Science and Technology (IS&T) priority areas.

1.2 The grant supports multi-disciplinary teams to undertake early-stage research at Technology Readiness Levels (TRL) 2 to 5, over a period of 12 to 18 months. The program aims to validate the scientific and technical potential of novel concepts, helping bridge the gap between fundamental research and practical defence applications. Projects are expected to generate promising outcomes that position them for further investment and development beyond the grant's completion.

2. About the Grant

2.1. The Quantum Sensing Grant supports multi-disciplinary collaborations between academics from QDSA and DIN member universities, industry and other Australian universities to accelerate the translation of technologies into Defence capability.

2.2. Applicants should scope project proposals only within the problem statement published in the call for proposals.

2.3. The funding scheme is administered by the Queensland Defence Science Alliance and the Defence Innovation Network.

3. Funding

3.1. $400,000 is available to support R&D projects aligned with the published topics.

3.2. QDSA and DIN will support one project with eligible costs to a maximum of $400,000 scoped for 12–18 months. The project budget will be assessed on merit, and the panel reserves the right to amend project funding.

3.3. To ensure equitable collaboration, funding must be evenly distributed between QDSA and DIN member institutions. For example, a project awarded $400,000 must allocate $200,000 to QDSA-affiliated partners and $200,000 to DIN-affiliated partners.

Guidelines | QDSA-DIN Quantum Sensing Grant 1

https://defenceinnovationnetwork.com/qdsa-din-quantum-sensing-grant-2026/

https://qdsa.au/qdsa-funding/

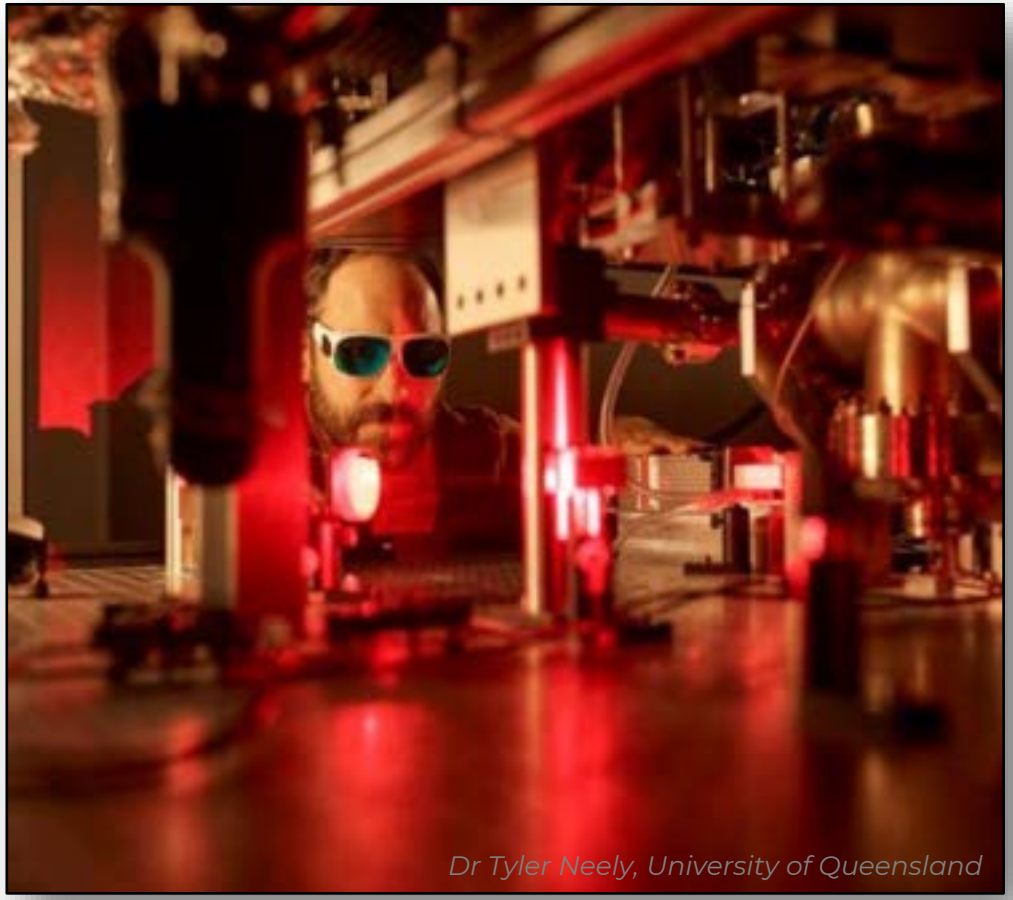
Opening remarks

Assoc Prof Marian-Andrei Rizoiu
Director
Defence Innovation Network

Stuart Blackwell
Director
Queensland Defence Science Alliance

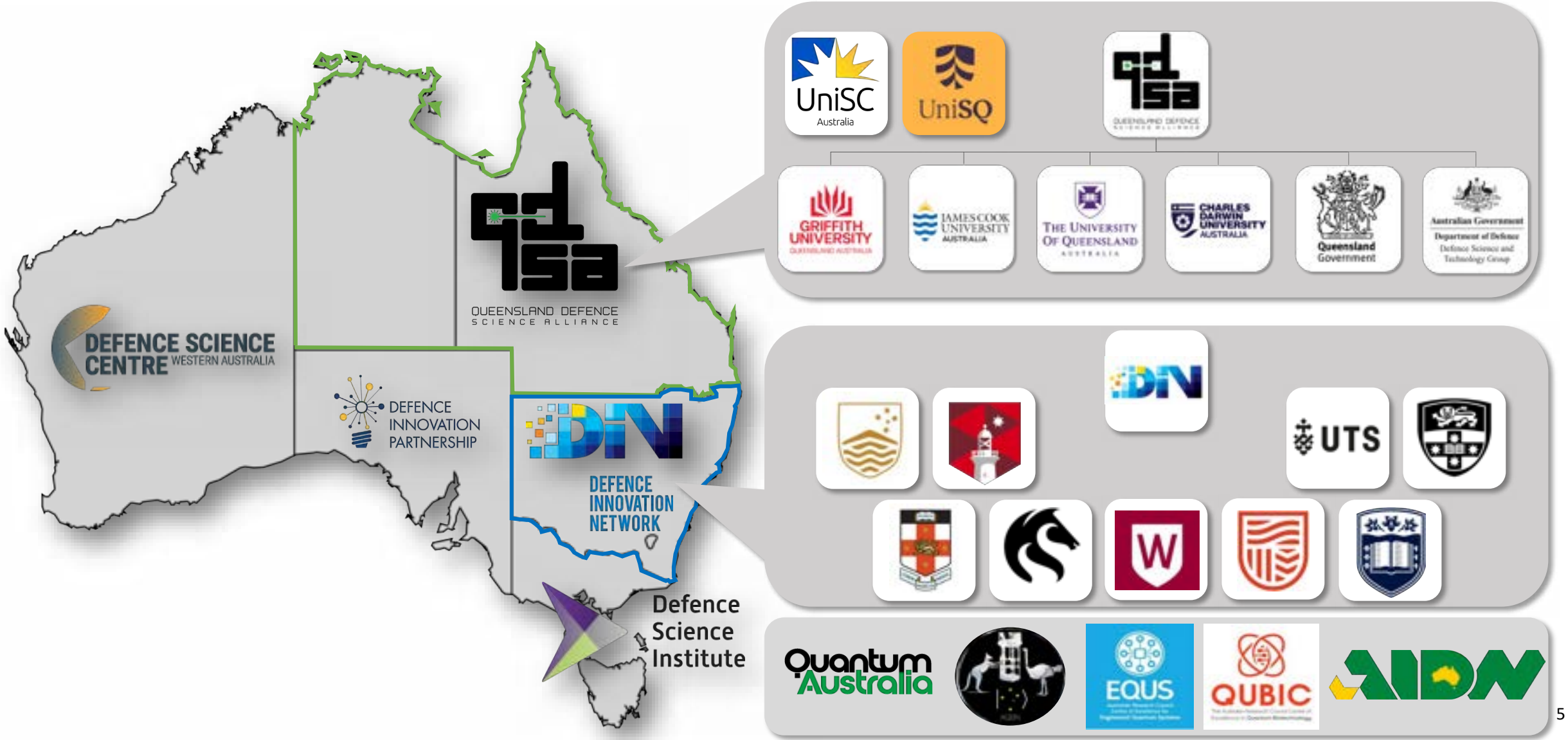
Background

- Strengthen national collaboration across the R&D space within the national Defence sector aligned with the Innovation, Science & Technology (IS&T) priorities:
  - Long-range fires and hypersonic weapons
  - High-energy lasers
  - Autonomous systems
  - **Quantum technologies**
  - Artificial intelligence
  - Undersea warfare
- Focused on **bringing together multi-disciplinary teams** at the TRL 2 - TRL 5 across Queensland (Northern Territory) and New South Wales (Australian Capital Territory).
- Open to ADSUN universities from Queensland & NT and New South Wales & ACT within the grant theme of **Quantum sensing for extreme environments**



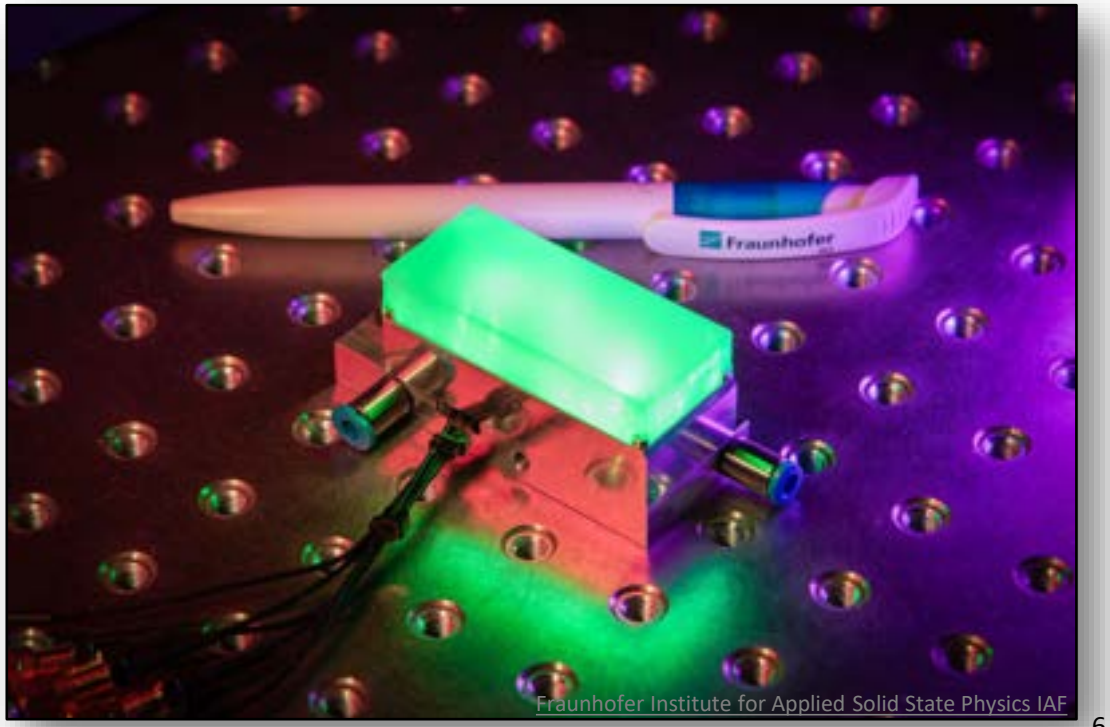
Dr Tyler Neely, University of Queensland

ADSUN Multi-State Collaboration



Theme & Topics

- **Theme: Quantum Sensing for Extreme Environments**
- Proposals shall investigate **sensor performance** and **optimisation under harsh conditions**.
- Expected to conclude with a **field demonstration** of a prototype
- Operational environments would include:
  - Hot, humid, dusty & large temperature variations
  - High acceleration/ large g-forces
  - Robustness, low size, weight, power – cost (SWAP-C)
  - High availability
- Potential Defence applications include:
  - Autonomous systems
  - Undersea navigation
  - Subsurface detection
  - Hypersonic vehicles
  - Radio Frequency sensing



Fraunhofer Institute for Applied Solid State Physics IAF

Potential Defence Applications

Autonomous Systems (Air, Land, Sea and Undersea)

Challenges include:

- **GPS denial or degradation** due to jamming, spoofing or operating in environments where GPS is unavailable (indoors, underground, underwater).
- **Error drift** in conventional IMUs over time, particularly during long duration missions without external updates.
- **Environmental degradation**, including vibration, shock, temperature extremes and electromagnetic interference, which reduce sensor accuracy and reliability.
- **Limited perception in complex or obscured environments**, such as dust, smoke, foliage, or underwater.
- **Trade-offs** between sensitivity, bandwidth, size, weight, power and cost (SWaP-C).

Potential Defence Applications

Undersea Navigation

Challenges include:

- **GPS signals do not penetrate water**, forcing reliance on dead reckoning, acoustic navigation aids or surfacing for position updates.
- **Acoustic systems are bandwidth limited**, vulnerable to interference, and risk revealing platform location.
- **Navigation uncertainty accumulates rapidly**, particularly for long range submarines and autonomous underwater vehicles (AUVs).
- **Harsh conditions**, including pressure, salinity, temperature gradients and biofouling, degrade sensor performance.

Source: Defence Images

Potential Defence Applications

Subsurface Detection

Challenges include:

- **Conventional radar and seismic methods** have limited penetration depth and resolution, depending strongly on soil composition and moisture.
- **High false alarm rates** arise from environmental clutter and geological variability.
- **Operational constraints** such as urban environments, noise and access limitations reduce effectiveness.
- **Slow survey times** limit tactical responsiveness

Source: Defence Images

Potential Defence Applications

Hypersonic Vehicles

Challenges include:

- **Very high temperatures**, plasma formation and thermal gradients that degrade conventional electronics and sensors.
- **High g-forces and vibration**, challenging inertial sensors and structural integrity.
- **Communications blackout** due to ionised plasma, limiting external navigation updates.
- **Precision guidance requirements** at extreme speed and manoeuvrability

Potential Defence Applications

Radio Frequency (RF) Sensing

Challenges include:

- **Electromagnetic congestion**, making signal discrimination increasingly difficult.
- **Low probability of intercept (LPI) and low observable systems**, reducing detectability using conventional receivers.
- **Susceptibility to jamming and spoofing**.

Conditions

- **Funding available:** Single grant award of **$400,000**
  - split between QLD ($200K) & NSW ($200K)
- **Duration:** 12-18 months
- **Co-funding:** Strongly encouraged
- **Eligibility:** Multi-disciplinary & multi-institutional collaboration teams must consist of:
  - Led by QDSA or DIN member university, and
  - Substantive inputs from min of one QDSA or DIN university listed at para 4.8
  - Industry participation strongly encouraged
- **Citizenship:** Must be Australian citizens.
- **ABN:** Industry must have an Australian Business Number
- **Obligations:**
  - Progress reports
  - Final report
  - Demonstration
- **Use of funds:**
  - Funds to be used to support the research project described in the application


Source: Defence Images

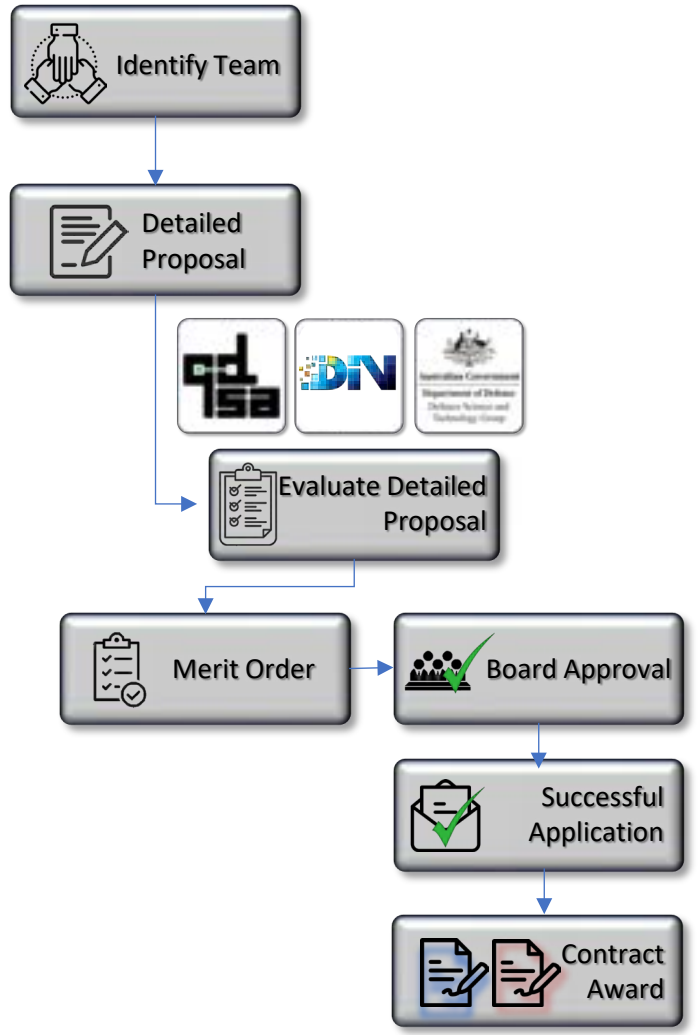
Collaboration

Queensland Defence Science Alliance *(Queensland & NT)*

- Charles Darwin University - Ksenia Sawczak
- Griffith University - Tori Brown
- James Cook University – John Matthews
- University of Queensland - Mike Brennan
- University of Southern Queensland -Hunter Walkenhorst
- University of the Sunshine Coast - Adrian McCallum

Defence Innovation Network *(New South Wales & ACT)*

- Australian National University - ANU Defence Institute
- Charles Sturt University - Dr Arif Khan
- Macquarie University - Matt van Breugel
- University of New South Wales - Joshua Sherman
- University of Newcastle - Bret Barton
- University of Sydney - Nicole Makoviney
- University of Wollongong - Ryah Perkiss
- University of Technology Sydney - Thomas Leoni
- Western Sydney University - WSU Business Services



Evaluation

Assessment Criteria

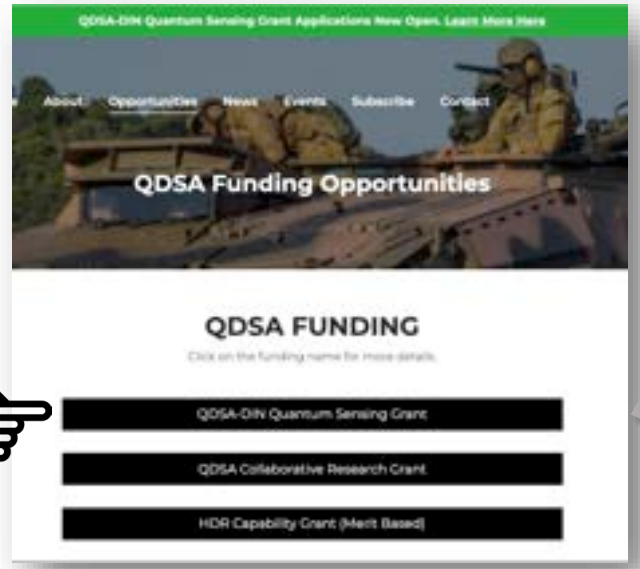
1. **Alignment**
   - Proposal alignment with the theme and topic to be addressed.
2. **Collaboration**
   - Breadth of the research team, comprising staff from multiple institutions. Collaboration across QDSA and DIN member universities.
   - Industry participation is strongly encouraged.
3. **Feasibility**
   - Ability to achieve the scope of the proposed project within the timeframe.
4. **Effectiveness & Impact**
   - How effective the proposed research will be to Defence to address the problem statement.
5. **Funding Requested & Co-investment**
   - Perceived value for money the proposal brings to Defence with reference to quantum of the dollars requested against the outcomes likely to be achieved.

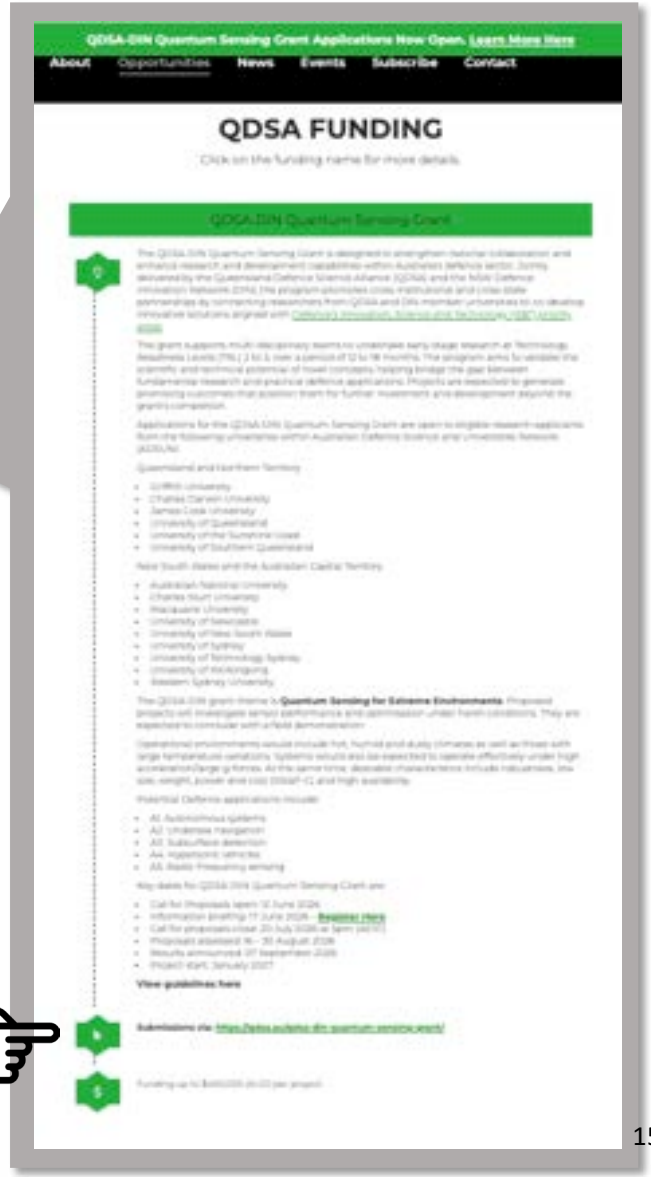
Source: Defence Images

Application

Ready to apply?

1 https://qdsa.au/qdsa-funding/





Important Dates:

- **12 June 2026** ..... Call for proposals is published
- **17 June 2026** ..... Information webinar
- **20 July 2026** ..... Proposals close 5PM AEST
- **16 – 30 August 2026** ..... Assessment process
- **07 September 2026** ..... Results announced
- **January 2027** ..... Project start

Questions

Clarifications via:

info@qdsa.au