ACCELERATING THE ADVANTAGE

QUEENSLAND DEFENCE SCIENCE ALLIANCE

2025 Northern Australia Project

Information Briefing

23 April 2025

DEFENCE SCIENCE CENTRE WESTERN AUSTRALIA

Mr Stuart Blackwell

Director, QDSA

Dr Roger Stuckey

Associate Director, QDSA

Agenda

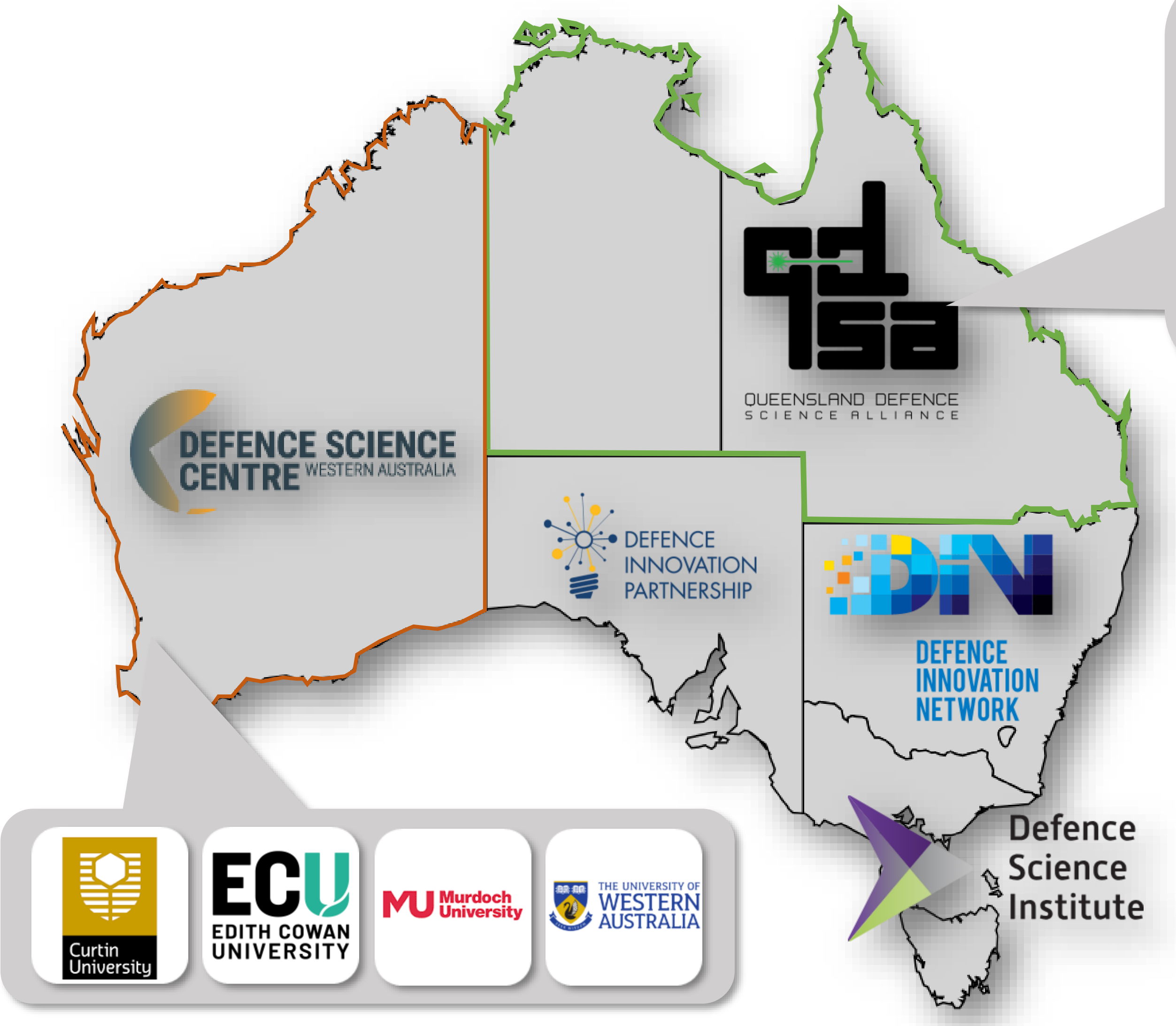
QDSA – DSC Northern Australia Project – Information Briefing

- The purpose of the Briefing is to:
  - Provide an overview of the 2025 Northern Australia Project, process and intent
  - Provide an opportunity for connection between Researchers across Queensland, Northern Territory and Western Australia

Proceedings

- Introduction
- 2025 Northern Australia Project scope and themes
- Process & key dates
- University capabilities and key contacts
- Questions

Introduction



Australian Defence Science University Network (ADSUN)

- Role of the nodes is to
  - promote **engagement between universities, industry and Defence**
  - Foster **collaboration** and skills exchange
  - Identify **opportunities** for technology and research and development
  - Provide **advice** on Defence priorities, capabilities, needs and gaps
  - Assist small business to understand the Defence supply chain
  - **Promote and showcase** Defence research and innovation

QDSA-DSC Northern Australian Defence Project

Northern Australian Defence Project Outline

The Northern Australia Defence Project is a proposal by QDSA in partnership with DSC to take advantage of the recent focus on Northern Australia as drawn out by the 2024 National Defence Strategy.

Requirements:

- Must demonstrate collaboration across three (3) states/territories *(QDSA and DSC Universities)*
- Research is focussed between TRL-2 (Applied Research) and TRL-5 (Lab Testing of integrated/ semi-integrated system)
- Duration of no more than 12-18 Months
- Up to $400,000 available for a single project to be selected related to Defence innovation focussed on northern Australia
- The project to be framed around one of the three themes:

  Theme 1: Logistics and manufacturing

  Topic: 1.1: Power and Energy

  Theme 2: Health and Human Performance

  Topic 2.1: Deployed Health

  Theme 3: C4ISR

  Topic 3.1: Remote and Autonomous ISR

- Open to co-design with DSTG and demonstration at the conclusion of the project

***Source**: 2024 National Defence Strategy*

QDSA-DSC NADP – Themes, Topics & Problem Statements

Logistics and Manufacturing: Power and Energy

<u>Issues and Challenges</u>

- Reliance on fixed source locations and existing/ad-hock supply chain networks.
- Lack of redundancy and resiliency in the network in high-threat environments.
- Inability to rapidly establish supply to newly identified locations.
- Challenges in transporting equipment and establishing supply across difficult terrain, including littoral, and in austere/damaged environments. This includes resupply and maintenance.
- High acoustic and thermal signature associated with some types of power generation equipment.

Power generation for equipment and systems, including life support, in forward-deployed and potentially conflict situations is problematic, given the complexity and volume of current fuel/re-fuelling systems, as well as dependency on resilient supply chains.

QDSA-DSC NADP – Themes, Topics & Problem Statements

Logistics and Manufacturing: Power and Energy

Capability Effects

- Ability to generate continuous power, without fuel transportation from storage centres/refineries or connection to a public electricity grid.
- Can be transported easily, into remote and littoral locations with minimal or no pre-deployed infrastructure necessary.
- Can be installed, operated, dismantled and transported to new locations as needed with a minimum of additional moving equipment.
- Is resilient to the harsh environmental conditions seen in Northern Australia.
- Has a low acoustic and thermal signature
- Smart grids, micro-grids, battery technologies and renewable energy sources (eg. solar, hydrogen).
- Rapid, dynamic, secure pre-positioning of minimum viable storage and infrastructure for energy harvesting.
- Energy demand reduction technologies.
- Modelling and simulation studies and a program of experimentation.

Power generation for equipment and systems, including life support, in forward-deployed and potentially conflict situations is problematic, given the complexity and volume of current fuel/re-fuelling systems, as well as dependency on resilient supply chains.

QDSA-DSC NADP – Themes, Topics & Problem Statements

Health and Human Performance: Deployed Health

Issues and Challenges

- Transportation from medical storage points to the point-of-need across potentially long distances and complex terrain.
- Robust storage of blood, critical resuscitation and other medical products, both in transit and at the point-of-need.
- Limited shelf-life and degradation in high ambient temperatures and high humidity which might demand cold-chain requirements.

The survivability of injured military personnel on and off the battlefield in Northern Australia is hampered by challenges of the environment as well as the delivery of medical care and products to remote locations

QDSA-DSC NADP – Themes, Topics & Problem Statements

Health and Human Performance: Deployed Health

<u>Capability Effects</u>

- Technological advancements in blood products, such freeze-dried and spray-dried plasma or shelf-life improvements in whole blood.
- Other asymmetric technologies to reduce bleeding in the battlefield.
- Products for the prevention and/or treatment of vector-borne diseases (eg. Malaria, Dengue fever) & bacterial diseases (eg. Melioidosis, Leptospirosis).
- Approaches to mental health care in remote areas.

The survivability of injured military personnel on and off the battlefield in Northern Australia is hampered by challenges of the environment as well as the delivery of medical care and products to remote locations

QDSA-DSC NADP – Themes, Topics & Problem Statements

Command, Control, Communications, Computers, Intelligence, Surveillance & Reconnaissance (C4ISR):
Remote and Autonomous ISR

Issues and Challenges

- Vast coverage requirements and the resources (including personnel) currently necessary.
- Lack of overlapping capabilities to remotely surveil areas and then interrogate/validate targets.
- Lack of integration of current systems feeding into the Common Operational Picture (COP). Most in-service systems are bespoke.
- RFSG consists primarily of Service Category (SERCAT) group 3-5 personnel (Reservists). Thus, the ability for initial and continuation training is limited.

Persistent terrestrial Intelligence, Surveillance & Reconnaissance in austere operating environments such as those in the north, with low force-space ratios, is limited

QDSA-DSC NADP – Themes, Topics & Problem Statements

Command, Control, Communications, Computers, Intelligence, Surveillance & Reconnaissance (C4ISR):
Remote and Autonomous ISR

Capability Effects

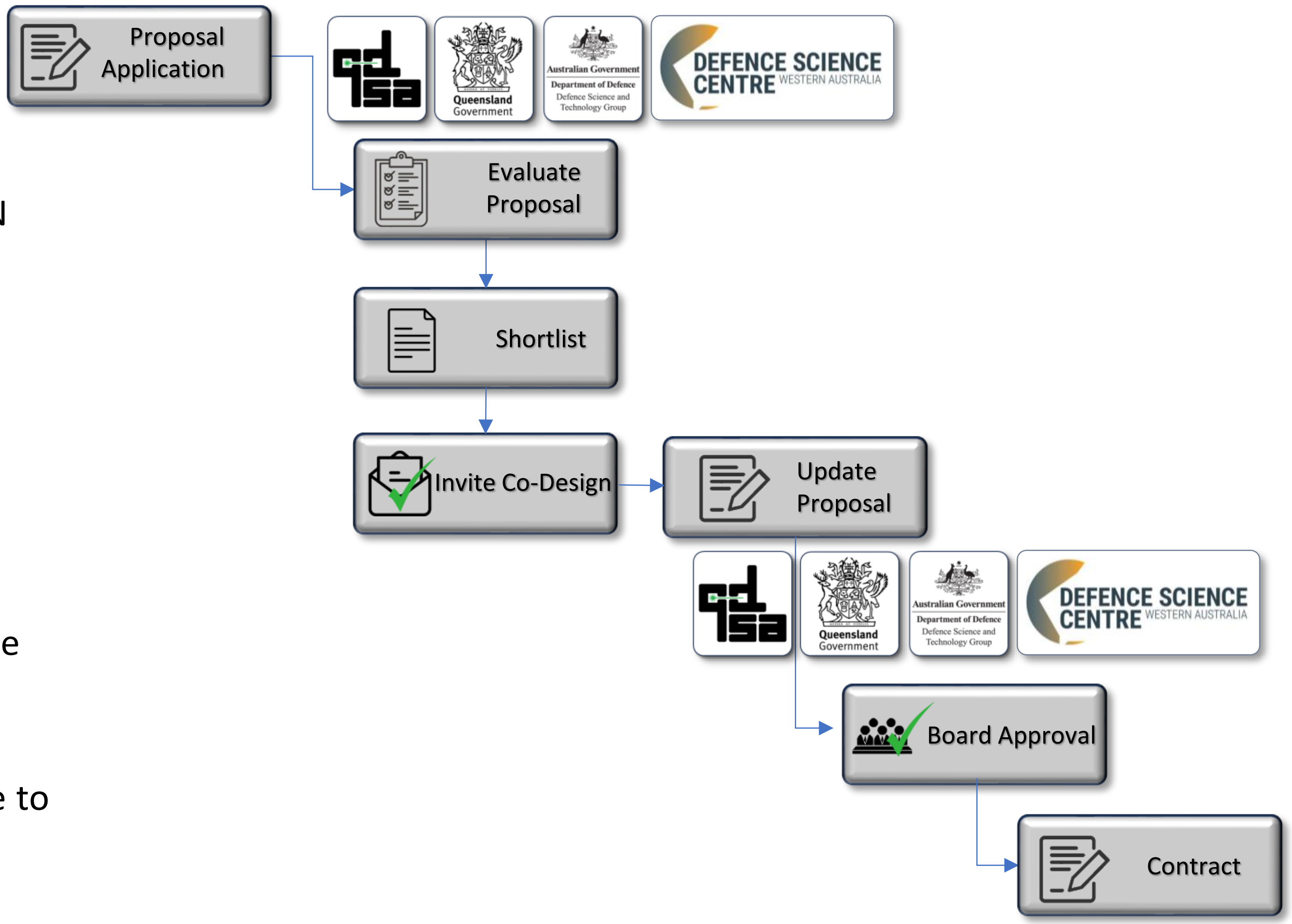
- Autonomous or semi-autonomous operation (reduced manning burden).
- Environmental resilience.
- Organically powered as part of the system as a whole.
- Complimentary integration with current in-service systems.
- Coupled with EO/IR or other frequency ranges.
- Able to be employed as a leave-behind system (no sensitive components).
- Seismic and acoustic sensor to cover large areas with persistent coverage.
- Amphibious capability if too large to be transported by boat (towable).
- Edge AI/ML capabilities for pattern detection, target classification, etc.
- Long-dwell sensor pods with energy harvesting and minimal maintenance.
- Low-bandwidth data transmission protocols for efficient COP updates.

Persistent terrestrial Intelligence, Surveillance & Reconnaissance in austere operating environments such as those in the north, with low force-space ratios, is limited

Evaluation process

What are the evaluation criteria?

- **Alignment.**
  - Alignment with Theme and Topic
- **Collaboration.**
  - Level of collaboration across QLD, NT and WA ADSUN universities
- **Feasibility**
  - Ability to achieve the scope of the project
  - Ability to meet the proposed schedule
  - Compliant within 12-18 month
- **Effectiveness**
  - Effectiveness of the research to Defence in solving the problem space
- **Funding Requested**
  - Perceived value for money to Defence with reference to quantum of dollars requested and outcomes to be achieved



Applying for Northern Australia Project - Example

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

1

Note: The published Guidelines located on the QDSA website have primacy over this presentation.

Home About Opportunities STaR Shots News Events Subscribe Contact

QDSA Funding Opportunities

QDSA FUNDING

Click on the funding name for more details.

QDSA-DSC Northern Australian Defence Project

The QDSA-DSC Northern Australian Defence Project is a proposal by QDSA to take advantage of the recent shift of attention to the region and an effort to enhance and build Defence capability there, as outlined in the National Defence Strategy (NDS). At the same time, there is an increased focus on developing sovereign IS&T programs and projects on a national scale through networks including the Australian Defence Science and Universities Network (ADSUN).

Applications for the QDSA-DSC Northern Australian Defence Project are open to research applicants from universities within Australian Defence Science and Universities Network (ADSUN) in Queensland and Northern Territory; Griffith University, James Cook University, University of Queensland or Charles Darwin University; and from Western Australia; Curtin University, Edith Cowan University, Murdoch University and The University of Western Australia.

The QDSA-DSC Northern Australian Defence Project is defined by three themes, with a set of topics under each. The topics provide a problem statement with relevant context as defined by Defence. For 2025, a single topic under each theme is prescribed. The themes and topics are as follows:

- **Theme 1: Logistics and Manufacturing**
  - Topic 1.1: Power and Energy
- **Theme 2: Health and Human Performance**
  - Topic 2.1: Deployed Health
- **Theme 3: Command, Control, Communications, Computers, Intelligence, Surveillance & Reconnaissance (C4ISR)**
  - Topic 3.1: Remote Autonomous Intelligence, Surveillance, and Reconnaissance

Key dates for QDSA-DSC Northern Australian Defence Project are:

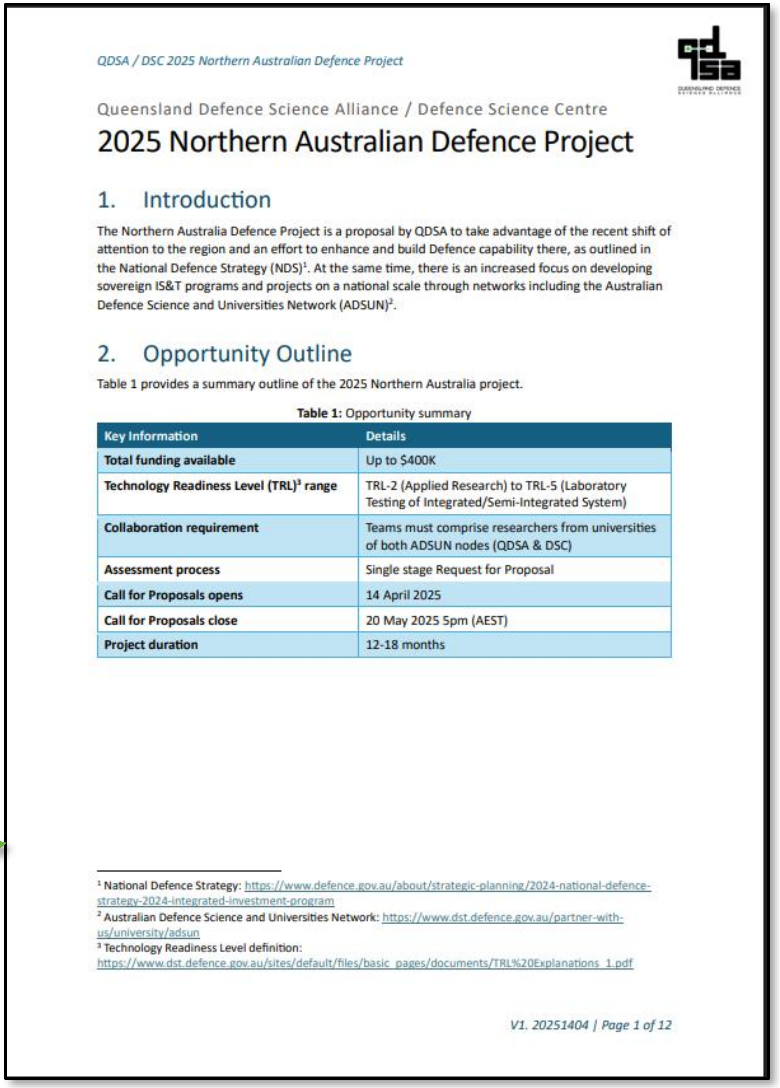
- Call for Proposals open: 14 April 2025
- Information briefing: 23 April, 2025 – Register Here
- Call for proposals close: 20 May, 2025

2

View guidelines here

Submissions via https://qdsa.au/northern-australian-defence-project

3



Queensland Defence Science Alliance / Defence Science Centre

2025 Northern Australian Defence Project

1. Introduction

The Northern Australia Defence Project is a proposal by QDSA to take advantage of the recent shift of attention to the region and an effort to enhance and build Defence capability there, as outlined in the National Defence Strategy (NDS)[1]. At the same time, there is an increased focus on developing sovereign IS&T programs and projects on a national scale through networks including the Australian Defence Science and Universities Network (ADSUN)[2].

2. Opportunity Outline

Table 1 provides a summary outline of the 2025 Northern Australia project.

Table 1: Opportunity summary

Key Information	Details
Total funding available	Up to $400K
Technology Readiness Level (TRL)[3] range	TRL-2 (Applied Research) to TRL-5 (Laboratory Testing of Integrated/Semi-Integrated System)
Collaboration requirement	Teams must comprise researchers from universities of both ADSUN nodes (QDSA & DSC)
Assessment process	Single stage Request for Proposal
Call for Proposals opens	14 April 2025
Call for Proposals close	20 May 2025 5pm (AEST)
Project duration	12-18 months

[1] National Defence Strategy: https://www.defence.gov.au/about/strategic-planning/2024-national-defence-strategy-2024-integrated-investment-program
[2] Australian Defence Science and Universities Network: https://www.dst.defence.gov.au/partner-with-us/university/adsun
[3] Technology Readiness Level definition: https://www.dst.defence.gov.au/sites/default/files/basic_pages/documents/TRL%20Explanations_1.pdf

Key Dates

Date	Activity	Comment
14 April 2025	Call for Proposals open	Guidelines via QDSA.au website
23 April 2025	QDSA - DSC Information Brief	*You are here*
20 May 2025	**Application for proposals close (5pm AEST)**	**Applications received via qdsa.au**
26 May 2025	Proposals shortlisted and ranked	
9 June 2025	Successful proposal(s) notified	
23 June 2025	Planned Co-Design with Defence	
Q3 2025	Contract Award	

QDSA University Capabilities

Griffith University, Queensland, Australia

Quantum Technologies, including Sensing and Communication
• Integrated quantum photonics
• Chip-based waveguides
• Quantum superconductor technologies
• Trapped-ion techniques for bioparticle/biomolecule research

Logistics Networks and Supply Chain Resilience
• Catalysts for synthetic fuels and renewables
• Power and energy Systems including microgrids
• Logistic systems, enterprise architecture, distributed manufacture,
and workforce development

Multidisciplinary Material Sciences
• Silicon carbide, micro/nano sensors and hybrid materials
• Carbon dots for water quality monitoring, sensing heavy metals,
developing drug molecules

Deployed Health including Evacuation
• Mental health, wellbeing and suicide prevention
• Human performance and decision making
• Biomedical and rehabilitation engineering

Other Defence Science Capabilities
• Critical defence and regional security issues
• Public policy design and delivery

James Cook University Australia

Undersea Capabilities, including Surveillance
• Remote sensing through acoustic monitoring and radar
• Littoral systems autonomy
• Remote undersea sensing and processing
• Sensors and battery materials
• Anti-biofouling materials

Artificial Intelligence, including Generative AI
• Human-centred AI and large language modelling
• AI for autonomous systems

Agile Command and Control
• C2 and decision sciences
• Wireless communication technologies
• Simulation systems and environments

Multidisciplinary Material Sciences
• Microgrids and renewables
• Advanced additive high-temperature materials – high-speed systems/
space
• Green hydrogen generation and waste-to-energy
• Material testing under tropical conditions

Biotechnology and Human Enhancement
• Human performance in the tropics
• Medical countermeasures
• Socioeconomic impacts of Defence policy

The University of Queensland Australia

Quantum Technologies, including Sensing and Communication
• Magnetic field sensors
• QA-PNT and situational awareness
• Secure quantum communications
• Nano-photonic computing

Artificial Intelligence, including Generative AI
• AI applied to autonomous vehicles
• Human-centered AI
• Legal, ethical and social implications of autonomous systems
• Responsible automated decision-making

Information Warfare and Cyber
• Cyber security, autonomy and automation
• Data privacy and user data control
• Cyber law, ethics and criminology

Hypersonics and Counter-Hypersonics
• Computational fluid dynamic analysis
• Hypersonic electric propulsion and magnetohydrodynamics
• Flight testing experimentation and analysis

Multidisciplinary Material Sciences
• High-temperature polymer and ceramic matrix composites

Deployed Health, including Evacuation
• Human cognition, neuroscience, mental health, stress, and fatigue
• Medical countermeasures

Charles Darwin University Australia

Autonomous Systems, including Trusted Autonomy
• Remote-area drone operations including medical deliveries

Artificial Intelligence, including Generative AI
• Data analysis and decision support
• Explainable AI (trusted autonomy)

Information Warfare and Cyber
• Human-centric cyber security
• Digital forensics and cyber criminology
• Explainable AI-enabled cybersecurity
• Malware detection and attribution

Electronic Warfare and Directed Energy
• Gigahertz/terahertz photonics in communication and radar systems
• Photonic signal processing
• Optically controlled phased arrays

Advanced and Remote Manufacturing
• Cold spray metal 3D printing
• Combat-proven deployable parts fabrication in remote/austere conditions

Multidisciplinary Material Sciences
• Advanced alloy development and certification
• Nanofibre materials development
• Tropical equipment development and testing

Deployed Health, including Evacuation
• AI-enabled automated in-theatre health monitoring and diagnostics
• Tropical health

See QDSA Capability Statement for more detail

QDSA University POCs

Member university points of contact available to discuss Northern Australia project collaboration

Griffith University
Queensland, Australia

Ms Tori Brown
tori.brown@griffith.edu.au

James Cook University
Australia

Dr Mick Reilly
mick.reilly1@jcu.edu.au

The University of Queensland
Australia

Dr Greta Nabbs-Keller
g.nabbskeller@uq.edu.au

Charles Darwin University
Australia

Dr Ksenia Sawczak
ksenia.sawczak@cdu.edu.au

DSC University Capabilities

Murdoch University

- **Quantum, AI and cyber**
  - Quantum processing
  - Digital forensics
  - Block-chain to enhance supply chain security
  - Image, sound and NLP anomaly detection
- **Human performance optimisation**
  - Behaviour dynamics
  - Cognitive enhancement via AI and advanced simulation training
  - Recruitment and retention
- **Multidisciplinary Material Science**
  - New materials including nanotech and tamper materials
  - Energy systems
  - Critical minerals and metals
- **Intelligence and Security**
  - Methods to understand and detect misinformation
  - Individual, social and organisational behaviours as indicators of mal intent
- **Strategic Defence, Intelligence and Security Policy**
  - Understanding of the strategic environment contributing to Australia's national security including diplomatic relations, policing and corruption.
- **Medical Countermeasures**
  - Rapid development of vaccines, therapeutics and diagnostics for the protection against CBRN threats
  - Rapid field-testing and sample collection tools and robotics.
- Contact: Andre` deSouza, **defence@murdoch.edu.au**

Curtin University

- **Build and Sustainment**
  - Nuclear forensics and safeguards
  - Platform engineering, optimisation, & asset management
  - Condition monitoring, corrosion and biofouling
  - Advanced/additive manufacturing, non-destructive testing (NDT) & material characterisation
  - Defence critical minerals & energy transitions
- **Space-to-Seabed**
  - Advanced space, land and undersea sensing
  - Integrated detection models & algorithms (AI/ML)
  - Maritime mapping & MetOcean
  - Quantum sensing and technologies
  - Underwater communications
- **Next Generation Defence Technologies**
  - Electronic warfare and signals intelligence
  - Advanced combat system software architectures
  - Secure collaboration platforms (Nebula)
- **Robotics & Autonomation**
  - Autonomous and remote systems & swarming
  - AI-driven decision making & adaptive control
  - Human-robot interaction & trust
- **Workforce Development**
  - Targeted skills & training
  - Talent pipeline, recruitment & retention, incl. new pathways

**All enabled by Human Performance*

The University of Western Australia

- **Information warfare and Cyber**
  - System security modelling
  - Moving target defence
  - Network analysis and anomaly detection
  - AI-driven cybersecurity
- **Undersea Capabilities**
  - Ocean glider technology and autonomous vehicles
  - Deep-sea imaging and sampling systems
  - Coastal and offshore engineering
  - Human-in-loop submarine control simulation
- **Artificial Intelligence and Autonomy**
  - Human-machine teaming
  - Autonomous decision systems
  - Adversarial AI defence
- **Electronic Warfare**
  - Free-space optical communications
  - Advanced sensing and surveillance
  - Optical MEMS-based technologies
  - Atmospheric effects modelling
- **Quantum Technologies**
  - Advanced quantum sensors and communications
  - Low-noise precision measurement systems
  - Microwave oscillator technology
  - Hybrid quantum systems development

Edith Cowan University (ECU)

- **Information warfare and Cyber**
  - Defence personnel cyber training
  - Digital twins for automation
  - Maritime anomaly detection (AI/ML)
  - Electronic systems vulnerability testing
- **Maritime**
  - Underwater acoustic source identification
  - Human-machine communications
  - Reliable underwater messaging systems
  - Maritime anomaly detection
  - Autonomous systems research
  - Marine biosecurity
- **Engineering**
  - Advanced materials and manufacturing
  - High performance and lightweight structures
  - Material performance and durability
- **Health Sciences**
  - VR tactical parachute training
  - Physical injury prevention
  - Digital twinning development

DISP Accredited

Contact: defence.research@ecu.edu.au

See WA research Capability Statement for more detail

DSC University POCs

Member university points of contact available to discuss Northern Australia project collaboration

EDITH COWAN UNIVERSITY

Michele Clement
m.clement@ecu.edu.au

Curtin University

Gary Hale
gary.hale@curtin.edu.au

Murdoch UNIVERSITY

Andre deSouza
andre.desouza@murdoch.edu.au

THE UNIVERSITY OF WESTERN AUSTRALIA

Prof. Gia Parish
giacinta.parish@uwa.edu.au

FAQs

Serial	Question	Response
1	Do I need to collaborate with more than one university?	*No, but the nature of the grants is to collaborate so those that do will score better in the evaluation*
2	Do I need to collaborate with an industry partner?	*No, the grants are only open to ADSUN members from QLD, NT and WA*
3	Does QDSA take a stake in the IP?	*No, the IP arrangements are established between the parties only*
4	How many projects will be funded?	*We are looking for a single project that brings together researchers across QLD, NT and WA. However, if there are multiple projects which Defence identifies as a high priority during the evaluation, we may consider more than one project*
5	Do I need to ask for the full $400,000?	*No, ask for what your project needs to complete the scope of your proposal*
6	Can my team offer a co-contribution to the funding?	*Yes, while not essential co-contributions can be included (please identify the source of funding)*
7	Can non-member universities participate?	*No, the northern Australia research project is only open to ADSUN member universities within QLD, NT and WA*
8	Does my project have to start at TRL 2?	*No, QDSA & DSC will look at all collaborative projects proposed. However, TRL 2 – 5 is a guide to illustrate where most benefit is gained to Defence*
9	Can we apply more than once?	*Yes, you can apply on multiple teams*
10	Are the teams exclusive?	*No, we may ask during co-design for changes to your team to gain a more preferred outcome for Defence*

Get in touch

Stuart Blackwell

DIRECTOR

stuart.blackwell@qdsa.au

0417 333 505

Dr Roger Stuckey

ASSOCIATE DIRECTOR

roger.stuckey@qdsa.au

0421 212 142

Joanne Lubke

EXECUTIVE SUPPORT OFFICER

joanne.lubke@qdsa.au

0421 870 706

info@qdsa.au

https://qdsa.au/

LinkedIn QDSA

@QDSAlliance