DTECH

CONCEPT TO SOVEREIGN CAPABILITY

277
INDUSTRY-ACADEMIC COLLABORATIONS

DEFENCE TRAILBLAZER
CONCEPT TO SOVEREIGN CAPABILITY

A COLLABORATIVE PARTNERSHIP BETWEEN
Adelaide University | UNSW

SUPPORTED BY
Australian Government
Department of Education

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Australian Strategic Reactive Materials
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DTEX
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LEOLABS
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Silex Systems Limited
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CREST ROBOTICS
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CYNDR
DASSAULT SYSTEMES
De Stefano & Co
DEFENCE AND SECURITY EXPERTS
Dedicated Systems
duMonde
ecoJet ENGINEERING
ECO SPECTRAL
Eilbeck HEAVY MACHINING
EMP
ELECTRIC MOTOR POWER
ELECTRO BASE
SUPERCHARGE ANYTHING ANYWHERE
FMT
FRONTIER MATERIALS TECHNOLOGIES
FRONTIER SI
Ghost Fire Systems
GLIADIAGNOSTICS
GREENROOM ROBOTICS
HYPERSONIX LAUNCH SYSTEMS
INFINITY AVIONICS
INOVOR TECHNOLOGIES
INSIGHT VIA ARTIFICIAL INTELLIGENCE
ipau.
LOCKHEED MARTIN AUSTRALIA
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SALUS
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SEASKIP
CRITICAL INFRASTRUCTURE
SECURE
ADVANCED MANUFACTURING
SEITEC
Sentri
Silanna Group
SOUTHERN LAUNCH
Space Machines Company
SRC Aus
STÄRKE
Stratoship
SUPRASHOCK
ADVANCED TECHNOLOGIES
UBIQU
undatech
Uplift
Autonomous Air Logistics
VIDEN
Zendir

Foreword

Australia's strategic environment demands faster, more agile and collaborative approaches to capability development. Defence Trailblazer was established to meet this challenge and in just over three years, it has delivered national impact at speed and scale.

Through a collaborative partnership between industry, government and academia, Defence Trailblazer has reshaped how Australia translates research into deployable capability, strengthens its defence workforce, accelerates innovation and sovereign industrial capacity.

Supported by the Australian Department of Education, Defence Trailblazer's collaborative partnership between Adelaide University, UNSW and over 210 industry partners, has resulted in 277 industry-academic collaborative projects, the advancement of more than 110 technologies for real-world application, 800 students and industry upskilled and 87 innovative ventures accelerated.

Central to all this progress is a culture of deep collaboration across industry, government and academia. With over 180 Australian SMEs and 144 academics working in partnership aligned to Defence's strategic priorities, Defence Trailblazer has demonstrated a collaborative model that delivers sovereign capability, removes long standing barriers, and unlocks shared value across the defence innovation ecosystem.

The Defence Trailblazer's impact extends beyond capability, ACIL Allen has found that Defence Trailblazer's long-term economic impact for Australia, will boost the nation's GDP by $875million and support 1000 new high-value jobs over the next 20 years.

Together, these achievements demonstrate Defence Trailblazer's integral role in supporting Australia's national security and prosperity. We extend our sincere thanks to all our partners- industry, Defence and academia for their commitment, collaboration and shared ambition in driving this national impact. This DTECH Capability Booklet highlights our collective achievements from Concept to Sovereign Capability.

As Australia continues to face increasingly complex challenges, the legacy and momentum of Defence Trailblazer provide a powerful foundation for the next generation of sovereign capability.

Dr Sanjay Mazumdar,
Executive Director, Defence Trailblazer

Sanjay

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Our Impact

Defence Trailblazer was established to demonstrate approaches that close the gap between university research and deployable capability, not just for Defence but as part of a broader national push to lift commercialisation performance under the Department of Education's Trailblazer Universities Program. In just over three years, Defence Trailblazer has delivered significant national impact by rapidly accelerating defence innovation, strengthening sovereign capability, and deepening collaboration across industry, government and academia.

Its ecosystem now includes 210+ Australian industry partners (87% SMEs) focused on developing sovereign defence capability to support the Australian Defence Force. The initiative has advanced more than 100 technologies, supported 277 industry academic collaborations, and will contribute an estimated $875 million boost to Australia's GDP alongside 1,000 new high value jobs over the next two decades.

Through these collaborations, major technological breakthroughs have been achieved in quantum, space technologies and cyber security as well as advancing sovereign capabilities in AI, information warfare, robotics, autonomous systems, defensive hypersonics and countermeasures.

The program has empowered 355 innovators to develop deployable prototypes, rapidly translating ideas to market and accelerated 87 ventures with defence, technology, commercial and investment readiness.

Defence Trailblazer has upskilled 800 students and industry professionals and fostered early career industry pathways for students and academics through internships, industry sponsored PhDs and academic-industry secondments.

Collectively, these achievements underscore Defence Trailblazer's transformative impact as a national catalyst for innovation, workforce development, and sovereign defence capability.

210+
industry partners, of which 87% are SMEs

100+
technologies advanced

277
industry-academic collaborations

800+
students and industry professionals upskilled

87
ventures accelerated

$875m
boosting Australia's GDP

"DSTG is pleased to be collaborating with Defence Trailblazer to strengthen Australia's defence sovereign capabilities. Defence Trailblazer is an important part of our Defence innovation ecosystem helping to remove barriers to commercialisation, supporting new ventures, and upskilling the defence industry."

— Dr Nigel McGinty, Chief, Human and Decision Sciences Division, Defence Science and Technology Group

"Defence Trailblazer has established itself as a key stakeholder and foundational element of the defence industry ecosystem.

— Wing Commander, RAAF

"We commend the Defence Trailblazer program for fostering innovation and collaboration between industry and Defence. Initiatives such as this are vital to ensuring Australia's sovereign capability.

— Major, Australian Army

"The Defence Trailblazer DINAMIC program has been instrumental in accelerating our company's growth and technological advancements... we have recieved essential support and guidance, enabling us to progress and scale effectively through the TRL stages.

— Emily Pyke, Co-founder, UndaTech

"As a venture capital firm deeply embeedded in this sector, we have witnessed first hand the program's impact in nurturing emerging technologies, connecting them to vital partners, and accelerating their pathways to commercialisation.

— Oscar Leslie, Director, Phase VC

"CAE Australia is honoured to participate in the Defence Trailblazer program. Together with UNSW, we can accelerate the implementation of training technologies to enhance the mission preparedness, safety, and performance of our personnel – our most critical asset in defence capability.

— Matthew Sibree, Managing Director Indo-Pacific, CAE Defence & Security,

OUR IMPACT

85+

R&D projects completed or underway

$138+ million

worth of R&D development in progress

80%

SME led projects

110+

demonstrations of innovative new technologies to defence and/or defence industry

140+

academics activated into R&D collaborations with 45 industry partners

Defence Trailblazer Research & Development

TECHNOLOGY DEVELOPMENT AND ACCELERATION (TDA) & ACCELERATING SOVEREIGN INDUSTRIAL CAPABILITIES (ASIC) PROJECTS

A key objective of the Defence Trailblazer is to foster agility in R&D commercialisation – pushing concepts across the "valley of death" and into production. Over 85 percent of Defence Trailblazer's industry partners are small to medium enterprises (SMEs), locally grown companies.

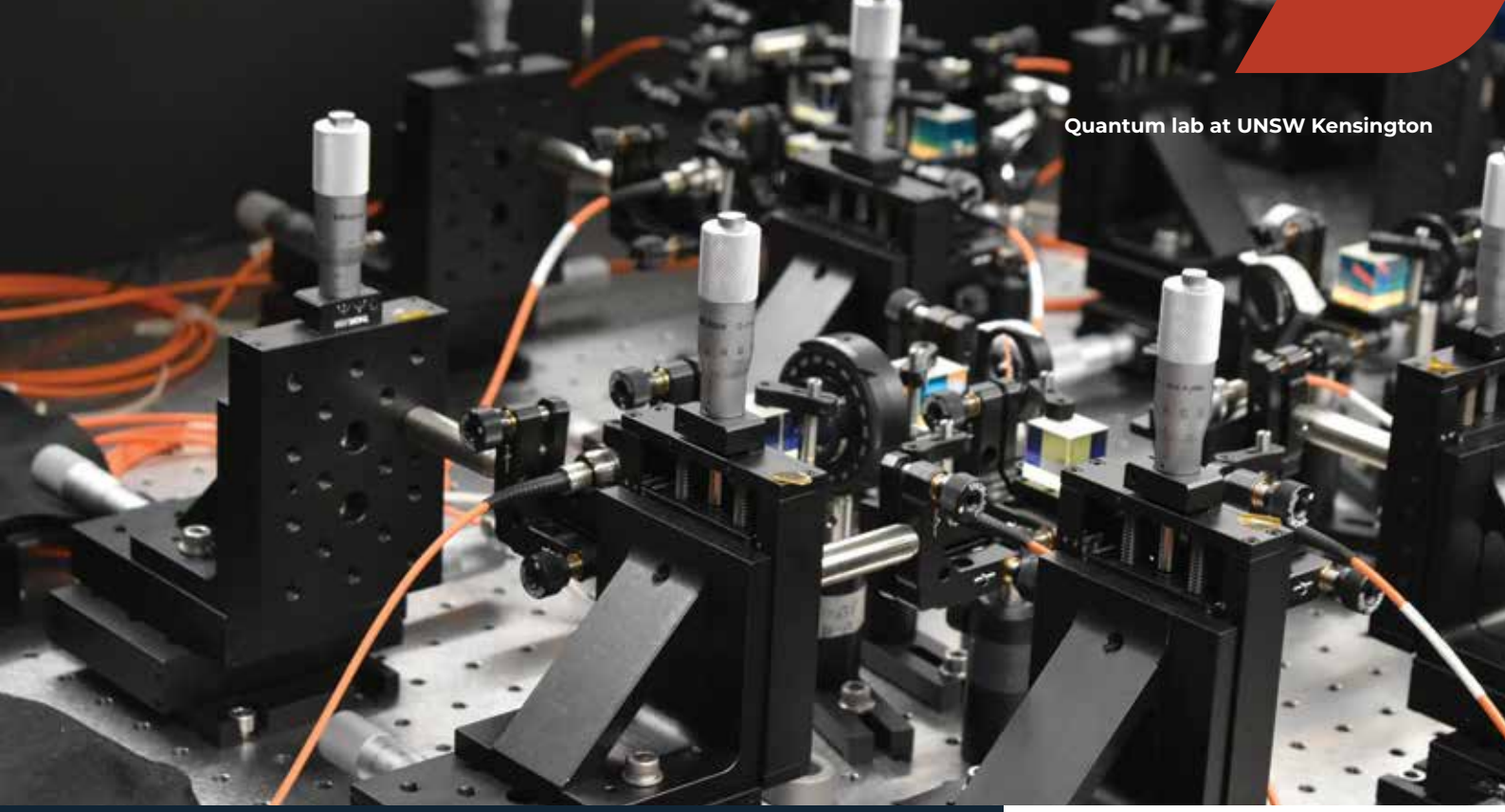
In collaboration with industry, academic and defence partners, Defence Trailblazer is supporting 90 major R&D projects aimed at accelerating the translation and commercialisation of leading-edge technologies and solutions to enhance Australia's sovereign defence capabilities.

Projects funded are aligned to the following key priority areas:

1. Quantum Materials, Technologies & Computing (p 10)
2. Defensive Hypersonics & Countermeasures (p 19)
3. Defence Space Technologies (p 22)
4. Information Warfare & Advanced Cyber Technologies (p 27)
5. Robotics, Autonomous Systems & AI (p 35)
6. Defence Materials (p 52)

Plus, a final combined capability section on page 54.

Quantum Materials, Technologies & Computing



Quantum lab at UNSW Kensington

Free-space Quantum Key Distribution (QKD) for quantum communication technologies

UNCONDITIONAL SECURITY FOR DEFENCE COMMUNICATIONS

PROBLEM

Classical cryptographic solutions cannot be proven secure under post-quantum computing. QKD offers the only means of unconditionally secure communications, and the first commercial offerings are already on the market.

SOLUTION

Northrop Grumman Australia and UNSW are developing a free-space-optical QKD system based on the use of single-photon technology. The objective is to design and test a satellite-based QKD system that will deliver a higher rate relative to existing quantum satellites already in space.

CAPABILITY ADVANTAGE

This project enables ultra-secure communications that would be impervious to adversarial attacks in the electromagnetic spectrum.

TARGET INDUSTRY

Defence communications and cryptography

PROJECT LEADS

Professor Robert Malaney
University Chief Investigator
UNSW

Dr Dushy Tissainayagam
Partner Investigator
Northrop Grumman Australia

NORTHROP GRUMMAN

UNSW

Quantum Materials, Technologies & Computing

Project Delivery: December 2026

Project Duration: 39 Months

TRL 6

TRL 5-6

Demonstrations with industry

northropgrumman.com/who-we-are/global-presence/northrop-grumman-in-australia

Pictured left to right: Emily Ouro, Project Manager; Dr Margaret Law, General Manager – Technology Development & Acceleration (both Defence Trailblazer); Michael Brown MP, Assistant Minister for Artificial Intelligence, Digital Economy, Defence and Space Industries; Rob Denney – Country Executive Australia (Northrop Grumman); Piers Lincoln, Manager of the Institute for Photonics & Advanced Sensing (IPAS), Adelaide University. Photographed at the Indo Pacific International Maritime Exposition 2025, Sydney.

Hollow Core Fibre fabrication capability demonstration

CAPABILITY FOR NEXT GEN GYROSCOPES

PROBLEM

Fibre optic gyroscopes (FOGs) are a key component in modern navigation systems, but their performance can be affected by noise from glass optical fibres.

SOLUTION

Northrop Grumman Australia and researchers from the Institute of Photonics and Advanced Sensing (IPAS) at Adelaide University have demonstrated a proof-of-concept phase in developing next generation optical fibres for inertial navigation. The use of hollow-core optical fibres in FOGs can significantly reduce noise and improve the performance and long-term accuracy.

CAPABILITY ADVANTAGE

The ability to domestically fabricate fibres for FOGs strengthens Australia's sovereign industrial capability.

TARGET INDUSTRY

Defence, advanced manufacturing

PROJECT LEADS

Dr Erik Schartner
University Chief Investigator
Adelaide University

Dr Dushy Tissainayagam
Partner Investigator
Northrop Grumman Australia

NORTHROP GRUMMAN

Adelaide University

Quantum Materials, Technologies & Computing

Project Delivery: June 2025

Project Duration: 12 months

TRL 6

TRL 5-6

Demonstrations with industry

northropgrumman.com/who-we-are/global-presence/northrop-grumman-in-australia

Dr Fred Baynes, Research Group Leader, QuantX Labs and Dr Elizaveta (Liz) Klantsataya, researcher at the Adelaide University, in the Optical Atomic Clock Lab at IPAS.

Quantum Sensing and Timekeeping: Accelerating and strengthening sovereign advantage

REVOLUTIONISING SYNCHRONISATION WITH ATOMIC CLOCK TECHNOLOGY

PROBLEM

Our interconnected globe has a high dependence on the GPS satellite network which provides universal positioning and timing information. However, these GPS signals are also very vulnerable to jamming and spoofing.

SOLUTION

Quantum clocks can provide precise and secure synchronisation that outperforms the timing derived from GPS by many orders of magnitude, even when satellite signals are jammed or spoofed. By enhancing the production capacity of quantum sensors and fast-tracking the development of atomic clock prototypes, QuantX Labs and The Adelaide University are driving sovereign advantage. This project explores advancements to improve the long-term holdover of optical atomic clocks, strengthening defence and navigation systems.

CAPABILITY ADVANTAGE

Providing resilience for Defence capabilities, including navigation and positioning, reconnaissance and surveillance, and command and control.

TARGET INDUSTRY

Defence, Space, GPS & critical infrastructure (data centres, electricity networks, stock exchanges, telecommunications)

PROJECT LEADS

Dr Andy Boes
Lead Chief Investigator
Institute for Photonics and Advanced Sensing (IPAS), Adelaide University

Dr Sebastian Ng
Partner Investigator
QuantX Labs

QUANTX LABS

Adelaide University

Quantum Materials, Technologies & Computing

Project Delivery: November 2026

Project Duration: 24 months

TRL 8

TRL 8

Spin-out

quantx.com.au

QuantX Tempo atomic clock

Quantum Sensing and Timekeeping: Ytterbium Atomic Clocks

PRECISION TIMING FOR DEFENCE

PROBLEM

Precision timing is required for positioning, navigation, and timing (PNT), secure communications, and advanced sensor systems in military applications.

SOLUTION

QuantX Labs and Adelaide University are developing a next-generation low SWaP Ytterbium optical atomic clock, building on the pioneering technology invented at Adelaide University's Institute of Photonics and Advanced Sensing (IPAS). This collaboration combines the Institute's expertise in atomic physics and precision measurement with QuantX Labs advanced engineering and manufacturing capabilities, facilitating the transition of cutting-edge research into practical deployment.

CAPABILITY ADVANTAGE

This emerging technology has the potential to provide order-of-magnitude improvements to timing precision over existing commercial clocks.

TARGET INDUSTRY

Defence, Space, GPS & critical infrastructure (data centres, electricity networks, stock exchanges, telecommunications)

PROJECT LEADS

Dr Andy Boes
Lead Chief Investigator
Institute for Photonics and Advanced Sensing (IPAS), Adelaide University

Dr Sebastian Ng
Partner Investigator
QuantX Labs

QUANTX LABS

Adelaide University

Quantum Materials, Technologies & Computing

Project Delivery: August 2025

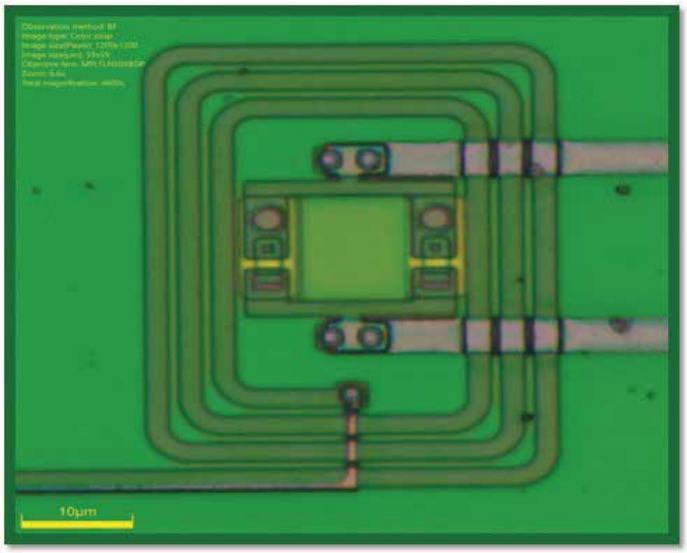
Project Duration: 12 months

TRL 6

TRL 6

Spin-out

quantx.com.au



Example of a simplified version of REQUIEM's superconducting quantum antennas (SQAs) based on a Superconducting Quantum Interference Device (SQUID)

Mixed Squid Array Demonstrator

NEXT GENERATION QUANTUM SENSORS

PROBLEM

Defence and civilian organisations have expressed a need for enhanced sensing systems that are more responsive to their environments. Current antenna systems can be bulky in size and experience performance limitations.

SOLUTION

The project partners are developing a new generation of quantum sensors known as a Mixed SQUID Array Demonstrator – using Superconducting Quantum Antennas (SQAs). SQAs will replace conventional antennas and will be capable of the highest sensitivity, linearity and dynamic range, combined with operation over an ultra-wideband frequency range.

CAPABILITY ADVANTAGE

SQAs provide significant benefit to undersea operations, including remote undersea platforms, as well as radar systems that increase situational awareness in remote locations or in the battlefield.

TARGET INDUSTRY

Defence, battlespace awareness

PROJECT LEADS

Dr Giuseppe Tettamanzi
Lead Chief Investigator Adelaide University

Keong Chan and John Rock
Partner Investigators
REQUIEM Systems | OTB Ventures

REQUIEM SYSTEMS

Out The Back VENTURES

Adelaide University

Quantum Materials, Technologies & Computing

Project Delivery: April 2026

Project Duration 12 months

TRL 7

TRL 6-7

R&D in progress

Spin-out

requiemsystems.com

SILEX Laser Isotope Separation for Q-Si. Image credit: Silex Systems Limited

Zero-Spin Silicon for Quantum Computing

ESTABLISHMENT OF A QUANTUM SILICON PRODUCTION PLANT AT SILEX

PROBLEM

Enriched Silicon-28 ('Quantum Silicon' or 'Q-Si') is a critical enabling material for the emerging silicon quantum computing industry. Previously, the main supply of enriched silicon came from Russia, but this source has been disrupted by geopolitical events.

SOLUTION

The project – a collaboration between Silex Systems Limited, Silicon Quantum Computing and UNSW Sydney – is establishing quantum silicon production capability in Australia to manufacture enriched Silicon-28, a critical material for silicon-based quantum processors. The project is culminating in the construction of the Q-Si Production Plant at Silex's Lucas Heights facility.

CAPABILITY ADVANTAGE

This initiative is securing a sovereign supply chain for Australia's quantum computing industry and positions Australia as a supplier of quantum-grade enriched silicon to allies and partners. It also enables the development of dual-use materials and technologies.

TARGET INDUSTRY

Quantum computing and semiconductor sectors

PROJECT LEADS

Professor Michelle Simmons
University Chief Investigator
Silicon Quantum Computing & UNSW

Dr Michael Goldsworthy
Partner Investigator
Silex Systems Limited

Silicon Quantum Computing

Silex Systems Limited

UNSW

Quantum Materials, Technologies & Computing

Project Delivery: December 2026

Project Duration: 41 months

TRL 9

TRL 9

Spin-out (Silicon Quantum Computing)

silex.com.au and sqc.com.au

A fluorine mineral sensor

Novel Fluorescence for real-time identification of materials, minerals and chemicals

ACCURATE DETECTION OF SPECIFIED MATERIAL

PROBLEM

The detection of chemical, biological, explosive and other material threats requires complex and often invasive detection methods. Identifying potential threats quickly is paramount to ensuring a safe environment and protecting personnel and assets.

SOLUTION

TeraGlo and Adelaide University researchers have developed discovery rigs capable of identifying the key fluorescence of any material using non-invasive lasers, allowing for the development of sensors specific to the targeted source. Each sensor is being prototyped in a hand-held device to prove its capability in the relevant environment.

CAPABILITY ADVANTAGE

Full implementation of the technology could allow for complete screening of target materials, depending on location and methodology – allowing for assurance of protection from the specified threats.

TARGET INDUSTRY

Defence and civilian explosives sensing, chemical and pathogen detection, construction (corrosion detection), critical minerals and asbestos detection.

PROJECT LEADS

Professor Nigel A. Spooner
University Chief Investigator
Adelaide University

Rob Loughan and Aaron Baensch
Partner Investigators
Teraglo

TERAGLO

Adelaide University

Quantum Materials, Technologies & Computing

Project Delivery: December 2026

Project Duration 20 months

TRL 7

TRL 7

Demonstrations with industry

teraglo.io

Left to right: John Rock, Director at OTB Ventures, UNSW Research Fellow Dr Adrian Mena and Professor Dane McCamey.

Prototype development and field testing of low-cost electronic quantum sensors

TACTICAL SENSING IN CHALLENGING AREAS

PROBLEM

Quantum sensors are an emerging technology with the potential to enhance sensing capability in challenging contestable areas, such as undersea and space. At present, quantum sensors tend to be based on systems that require significant infrastructure such as cooling, which can limit their use cases.

SOLUTION

UBIQUT and UNSW are producing quantum sensor prototypes based on organic light emitting diodes (OLEDs), an emerging quantum sensing platform. The project will address the challenge developing the quantum control hardware, electronics and software required to deploy the device in the field whilst keeping costs low using scalable fabrication technologies.

CAPABILITY ADVANTAGE

Demonstrating a low-cost deployable quantum sensing technology is a critical step in driving new use cases relevant for Defence, such as in autonomous undersea vehicles for tactical sensing of marine threats.

TARGET INDUSTRY

Defence, sensor manufacturers and systems integrators.

PROJECT LEADS

Professor Dane McCamey
University Chief Investigator
UNSW

Keong Chan and John Rock
Partner Investigators
UBIQUT | OTB Ventures

UBIQUT

Out The Back VENTURES

UNSW

Quantum Materials, Technologies & Computing

Project Delivery: June 2026

Project Duration: 16 months

TRL 7

TRL 7

Spin-out

otbventures.com.au

Defensive Hypersonics & Countermeasures

ENDEAVOUR AEROSPACE

HB11 ENERGY
LASER BORON FUSION

LOCKHEED MARTIN
AUSTRALIA

Endeavour Aerospace's Sovereign SRM test fire

Solid Rocket Motors development

ASSURING AUSTRALIA'S SOVEREIGN SUPPLY CHAIN

PROBLEM

Australia's defence industry currently faces a critical vulnerability in its reliance on foreign suppliers for solid rocket motors (SRMs), which are essential components in guided weapons and explosive ordnance (GWEO) systems. This dependence exposes Defence to supply chain disruptions, export control constraints, and delays in capability deployment.

SOLUTION

This project will design and test a sovereign, UN DG certified SRM prototype led by Endeavour Aerospace in collaboration with UNSW.

CAPABILITY ADVANTAGE

In developing a sovereign, UN DG certified SRM product, this project will help to build a resilient, sovereign industrial base.

TARGET INDUSTRY

Defence and aerospace

PROJECT LEADS

Associate Professor Victoria Timchenko
Lead Chief Investigator
UNSW

Madison Weekes
Partner Investigator
Endeavour Aero

ENDEAVOUR AEROSPACE

UNSW

Defensive Hypersonics & Countermeasures

Project Delivery: September 2026

Project Duration: 9 Months

TRL 7

TRL 6-7

Demonstrations with industry

endeavouraerospace.com.au

Dr Warren McKenzie in the HB11 laser fusion research laboratory.

Commercialising fusion energy technology for the global energy transition

HIGH POWER ULTRA-SHORT PULSE LASER (UPSL) DEVELOPMENT

PROBLEM

As global energy demands continue to grow, the consideration and adoption of new alternative scalable energy sources is becoming increasingly necessary. Recent advancements have placed fusion energy on the horizon as a viable alternative clean energy source, made possible by USPL technology playing a crucial role in bringing this vision to life.

SOLUTION

Adelaide University DualTech-USPL Group and HB11 Energy are collaborating to advance the development and commercialisation of hydrogen-boron fusion technology. The project aims to create high-powered laser systems and establish the first Australian sovereign laser manufacturing capability.

CAPABILITY ADVANTAGE

The development of high-energy lasers will not only advance clean energy but also address critical needs across dual-use sectors, positioning Australia at the forefront of next-generation technologies in fields such as medical imaging and radiobiology, advanced sensing, directed energy, and the elimination of long-lived radioactive waste

TARGET INDUSTRY

Defence, clean energy, and health sectors

PROJECT LEADS

Professor Miftar Ganija
University Chief Investigator
Adelaide University

Dr Warren McKenzie
Partner Investigator
HB11 Energy

HB11 ENERGY
LASER BORON FUSION

Adelaide University

Defensive Hypersonics & Countermeasures

Project Delivery: March 2027

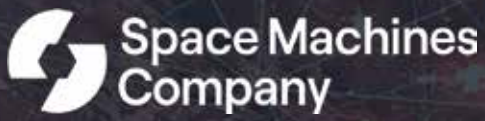
Project Duration: 30 months

TRL 4

TRL 4

hb11.energy

Defence Space Technologies



Non-earth imaging from Continuum-1

On-orbit Manoeuvre Detection and Rendezvous and Proximity Operations (RPO) Mission

THE FIRST DOMESTICALLY GENERATED RPO MISSION WITH AN ACTIVE PROPULSION SYSTEM

PROBLEM

RPO is a rapidly emerging challenge for Defence and industry that requires coordinated analysis to discriminate benign proximity operations from threatening behaviours. Australia currently lacks on-orbit test data and validated algorithms to confidently assess these manoeuvres.

SOLUTION

The proposed mission directly addresses this gap by demonstrating Australia's first controlled, internationally credible RPO scenario to demonstrate fuel-efficient, tactically relevant RPO manoeuvres using HEO's in-orbit satellite Continuum-1 as the operational platform. Leveraging the significant space flight heritage, SDA algorithms and sensor models developed at UNSW Canberra Space, the mission will deliver real spacecraft manoeuvre data, validated trajectories, photometric signatures, and multi-sensor observation datasets.

CAPABILITY ADVANTAGE

The project will provide strategies and optimisation tools for Australian satellite operators, establishing a sovereign foundation for long-term RPO capabilities.

TARGET INDUSTRY

Space

PROJECT LEADS

Associate Professor Melrose Brown
University Chief Investigator
UNSW Canberra

Daniel Nevius
Partner Investigator
HEO

HEO

UNSW

Defence Space Technologies

Project Delivery: February 2026

Project Duration: 12 Months

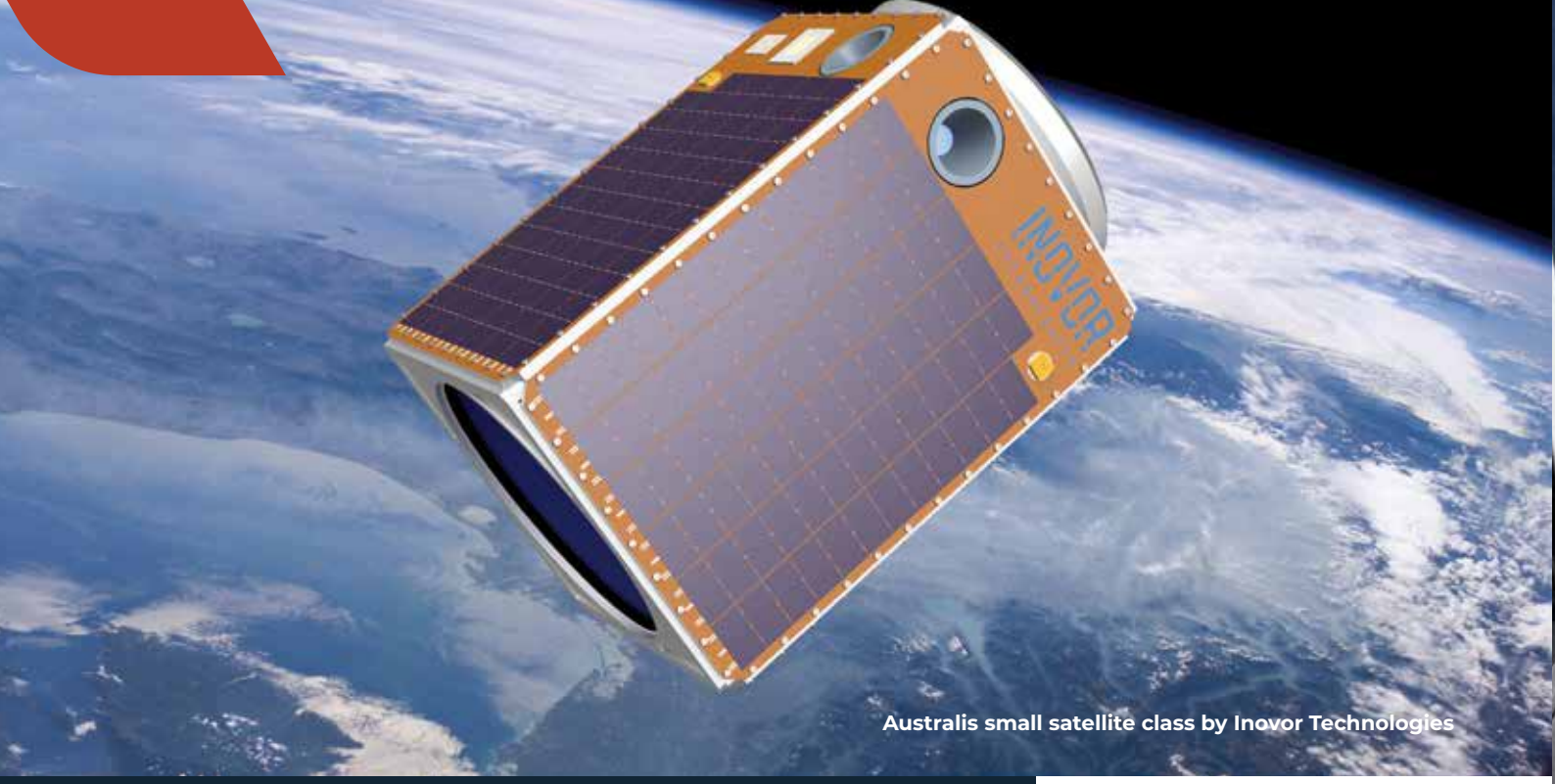
TRL 7

TRL 7

R&D in progress

Spin-out

heospace.com



Australis small satellite class by Inovor Technologies

Small Super Resolution Earth Imaging Satellite

SUPER-RESOLUTION APPROACH FOR EARTH IMAGING IN SPACE

PROBLEM

Small satellites–including microsatellites, nanosatellites, and CubeSats–offer cost-effective platforms for Earth observation, but size and weight limitations typically constrain their imaging resolution.

SOLUTION

Inovor Technologies and Adelaide University researchers are developing a small satellite that will demonstrate super-resolution imaging technology by integrating AI-assisted algorithms. The low-cost imaging satellites can detect fine-scale features, providing significant improvements in image quality from low-resolution sensor data.

CAPABILITY ADVANTAGE

The technology will enhance Australia's access to high-quality geospatial intelligence (GEOINT) that is sovereign owned and operated—supporting operational planning, monitoring, and decision-making by the Australian Defence Force.

TARGET INDUSTRY

Defence, Earth Observation, environmental monitoring and climate change respons

PROJECT LEADS

Professor TJ Chin
University Chief Investigator
Adelaide University

Dr Matthew Tetlow
Partner Investigator
Inovor Technologies

INOVOR TECHNOLOGIES

Adelaide University

Defence Space Technologies

Project Delivery: May 2027

Project Duration: 30 Months

TRL 9

TRL 9

R&D in progress

inovor.com.au

Satellite Systems Engineer Nick Manser (SmartSat CRC) and Adelaide University researcher Sofia McLeod, pictured in the Scarlet Lab at Lot Fourteen.

E-SPARC: Event-based Sensing Payload for Autonomous Rendezvous Control

REAL-TIME SENSING IN HARSH SPACE CONDITIONS

PROBLEM

Traditional sensing approaches in space are limited by lighting, dynamics or proximity constraints.

SOLUTION

SmartSat CRC's E-SPARC project will launch an event-based sensing payload and utilise it on a rendezvous and proximity operations (RPO) demonstration space mission. The project is a collaboration with the AI for Space Group at the Adelaide University, Infinity Avionics and international partner Blackswan Space.

CAPABILITY ADVANTAGE

Leveraging artificial intelligence, the system performs real-time perception capabilities to mitigate threats and defend space assets.

TARGET INDUSTRY

Defence, Space

PROJECT LEADS

Professor TJ Chin
University Chief Investigator
Adelaide University

Dr Carl Seubert
Industry Chief Investigator
SmartSat CRC

Dr Igor Dimitrijevic
Infinity Avionics

Dr Damith Abeywardana
Infinity Avionics

Dr Marius Klimavičius
Blackswan Space

SMARTSAT COOPERATIVE RESEARCH CENTRE

Adelaide University

Defence Space Technologies

Project Delivery: January 2027

Project Duration: 18 Months

TRL 6

TRL 6

Demonstrations with industry

smartsatcrc.com

Adelaide University researcher Mohsi Jawaid with an experimental satellite model attached to the orbital testbed's robotic arm.

Space-borne perception and intelligence technology for space domain awareness

AUSTRALIA-FIRST ORBITAL TESTBED TO ADVANCE SPACE MISSION

PROBLEM

Currently, there is a lack of mature technologies that provide space-borne perception, and means of testing reliability of control algorithms in the real Space environment.

SOLUTION

Space Machines Company and Adelaide University will develop technology that enables a host spacecraft to understand its immediate environment and achieve co-orbital space control. The project will also construct a state-of-the-art orbital robotics testbed to facilitate the development of payload prototypes.

CAPABILITY ADVANTAGE

With space becoming a contested domain, SDA is crucial to enable command and control of the orbital domain.

TARGET INDUSTRY

Defence, civil and commercial space servicing.

PROJECT LEADS

Professor TJ Chin
University Chief Investigator
Adelaide University

Mark Ramsey
Partner Investigator
Space Machines Company

Space Machines Company

Adelaide University

Defence Space Technologies

Project Delivery: February 2027

Project Duration: 26 Months

TRL 5

TRL 4-5

Demonstration with industry

spacemachines.com

Information Warfare & Advanced Cyber Technologies

Associate Professor John Arron Stride (UNSW), Dr Jason Holland (Aurora Materials), Dr Thomas de Prinse (Adelaide University).

Developing tunable emissive nanocomposites to accurately identify and authenticate military supplies

UNIQUELY IDENTIFIABLE TAGS FOR SECURE DEFENCE SUPPLIES

PROBLEM

Australia imports 95% of its military supplies and counterfeiting is a significant threat towards national security. Military equipment such as replacement electronic components are particularly vulnerable.

SOLUTION

Aurora Materials is accelerating the development of fluorescent markers to accurately identify and authenticate military supplies and capabilities, in collaboration with UNSW and Adelaide University. The project aims to deliver a prototype of Aurora Materials' proprietary security tags, which use light-based signatures from materials for rapid and accurate identification. The project will demonstrate a scalable manufacturing process using microwave assisted solvothermal synthesis.

CAPABILITY ADVANTAGE

The tags represent a unique solution to rapidly identify and authenticate valuable and mission assets in both combat Unmanned Aerial Systems and 'zero trust' supply chain domains.

TARGET INDUSTRY

Defence, materials sciences (scalable manufacturing of advanced materials).

PROJECT LEADS

Associate Professor John Stride
Chief Investigator
UNSW

Dr Thomas de Prinse
Chief Investigator
Adelaide University

Dr Jason Holland
Partner investigator
Aurora Materials

AURORA Materials

Adelaide University

UNSW

Information Warfare & Advanced Cyber Technologies

Project Delivery: December 2026

Project Duration: 18 months

TRL 5

TRL 5

Trials with Defence

Spin-out

auroramaterials.com.au

Cisco digital communications hardware and equipment.

Supporting platform resilience at the OT/IT edge

CUTTING-EDGE TECHNOLOGIES FOR SECURE MILITARY PLATFORMS

PROBLEM

With the growing use of uncrewed systems, military platforms are increasingly using networked sensors for telemetry data. However, new systems bring new vulnerabilities to cyber attacks and information warfare.

SOLUTION

Experts from Adelaide University and industry partner Cisco will assess the health, usage, and maintenance systems (HUMS) on military platforms and demonstrate a deployable solution to achieve greater cyber resilience. The research will focus on developing provable cyber defensive solutions by employing tools from graph theory, game theory and AI/Machine Learning (ML).

CAPABILITY ADVANTAGE

Through building and configuring systems that are secure by design and training trustworthy AI agents to help defend networked systems, the project will deliver practical solutions that help human operators deal with the complexity, fast-paced and deceptive nature of the cyber environments.

TARGET INDUSTRY

Defence and cybersecurity

PROJECT LEADS

Associate Professor Hung Nguyen
University Chief Investigator
Adelaide University

Angelo Puglielli
Partner Investigator
Cisco Systems

CISCO

Adelaide University

Information Warfare & Advanced Cyber Technologies

Project delivery: February 2026

Project Duration: 24 Months

TRL 6

Demonstrations with Defence

cisco.com

AI-powered workflows standardise high-trust assessments while preserving human oversight.

Artificial Intelligence Vetting to enhance insider threat risk mitigation

AI-ASSISTED VETTING TO ENSURE A TRUSTED WORKFORCE

PROBLEM

Efficient, effective, and scalable vetting procedures are required to enhance the trustworthiness of workforces and proactively mitigate insider threats. This involves time-consuming 1:1 interviews and risk assessments, and continuous evaluation is required.

SOLUTION

Cleard Life Vetting Agency and UNSW Canberra are developing AI tools to conduct 1:1 security interviews at scale. Building on Cleard Life's working prototype, the project is leveraging cutting-edge affective computing technology and human-centred AI algorithms to create AI-assisted vetting tools.

CAPABILITY ADVANTAGE

The project outcomes align with the critical need for secure, vetted and competent defence industry workforce to deliver on all Sovereign Defence Industrial Priorities.

TARGET INDUSTRY

Defence, critical infrastructure.

PROJECT LEADS

Professor Roland Goecke
Lead Chief Investigator
UNSW

Edward Barker
Partner Investigator
Cleard Life Vetting Agency

CLEARD LIFE
THE MISSING PIECE IS A CLEARD LIFE

UNSW

Information Warfare & Advanced Cyber Technologies

Project Delivery: December 2026

Project Duration: 12 Months

TRL 7

TRL 7

Demonstrations with industry

Employs veterans

cleard.life

Understanding and countering online influence

IDENTIFYING INFORMATION WARFARE IN ONLINE NETWORKS

PROBLEM

Accelerated by technological advancements, inflammatory content can be spread in online networks and transition from being a low-risk, fringe interest to becoming more dangerous as a larger, more susceptible audience is exposed to the narrative.

SOLUTION

Fivecast and Adelaide University researchers are developing a cutting-edge AI-enhanced online awareness tool that will inform decision makers, provide the data, the context and recommended actions. The tool will model the evolution of networks using a mix of content-based and graph theoretical metrics to measure influence. The final product will be a commercial off-the-shelf tool with clear user controls, and statistical explanations for ease of consumption.

CAPABILITY ADVANTAGE

The software will focus on identifying robust features that can withstand changes in tactics employed by influence operators, ensuring that the models remain effective as the landscape evolves.

TARGET INDUSTRY

Defence

PROJECT LEADS

Professor Lewis Mitchell
University Chief Investigator
Adelaide University

Dr Jason Signolet
Partner Investigator
Fivecast

FIVECAST

Adelaide University

Information Warfare & Advanced Cyber Technologies

Project Delivery: July 2026

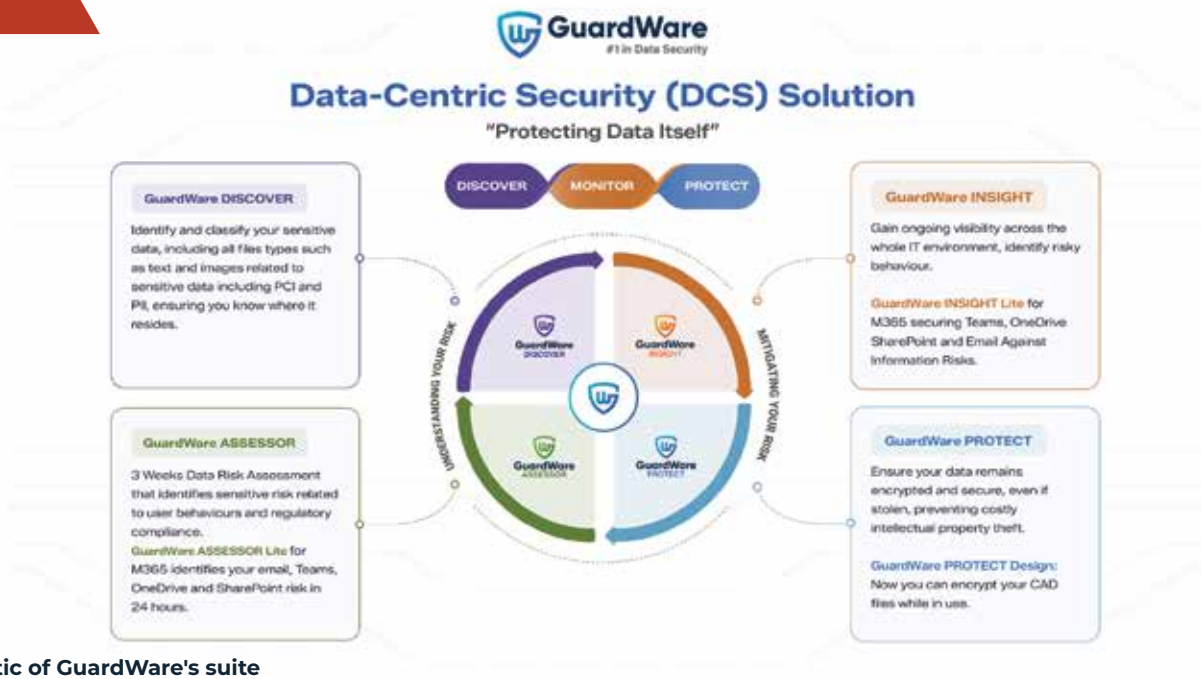
Project Duration: 18 Months

TRL 4

Demonstrations with industry

Spin-out

fivecast.com



A schematic of GuardWare's suite of tools, including PROTECT.

Resilience of supply chain unstructured data

PERSISTENTLY PROTECT SENSITIVE DATA IN THE DEFENCE SUPPLY CHAIN

PROBLEM

Cyber attacks on a company's supply chain are an existentialthreat to defence industry. Supply chain data is often stored in unstructured data files (such as engineering files, source code) that are unencrypted, putting them at serious risk of data theft if the login credentials of "trusted users" are compromised.

SOLUTION

GuardWare Australia and UNSW researchers are developing a sovereign solution that supports persistent file encryption.The project will develop file wrapping encryption using file system drivers, specifically the latency in encryption key generation and provision and support of air-gapped devices. The second phase of the project will develop independent control of a shared encrypted file, to provide data owners visibility and control over their data usage.

CAPABILITY ADVANTAGE

The solution keeps each individual file encrypted everywhere – on endpoints, in the cloud, across supply chains – without disrupting the way engineers, designers, and staff work. In the event of a system breach, data owners are safeguarded as any stolen or lost data is worthless.

TARGET INDUSTRY

Defence industry, manufacturing and design.

PROJECT LEADS

Professor Salil Kanhere
Lead Chief Investigator
UNSW

Associate Professor Sushmita Ruj
Chief Investigator
UNSW

Rizwan Mahmood
Partner Investigator
GuardWare

GuardWare

UNSW

Information Warfare & Advanced Cyber Technologies

Project Delivery: November 2026

Project Duration: 24 Months

TRL 9

TRL 9

Commercialised for dual-use

Owned by veteran

guardware.com.au

A Royal Australian Navy MH-60R Seahawk prepares to land on the flight deck of HMAS Adelaide during Wet and Dry Environment Rehearsals at Cowley Beach Training Area. Image credit: CPL Michael Rogers, Department of Defence.

Media deterrence through predictive modelling

A FUTURE PREDICTION MODEL OF IRREGULAR MIGRATION

PROBLEM

In an increasingly complex world, there is a heightened threat environment for irregular migration to Australia, particularly as disinformation about Australia's migration policies can cause people to embark on hazardous maritime journeys.

SOLUTION

This multi-party collaborative research project between M&C Saatchi World Services, Adelaide University and UNSW will establish a forecast of this irregular migration activity and then model the effects of potential deterrence intervention strategies.

CAPABILITY ADVANTAGE

The model's predictive capabilities will serve as an early warning system for potential future challenges, allowing Defence staff and decision makers to anticipate and prepare for future needs proactively.

TARGET INDUSTRY

Defence and Government Departments responsible for preventing, deterring and intercepting irregular migration journeys

PROJECT LEADS

Professor Lewis Mitchell
University Chief Investigator
Adelaide University

Professor Scott Sisson
University Chief Investigator
UNSW

Jonathon Tindale
Partner Investigator
M&C Saatchi World Services

M&C SAATCHI WORLD SERVICES

Adelaide University

UNSW

Information Warfare & Advanced Cyber Technologies

Project Delivery: August 2025

Project Duration: 6 Months

TRL 7

TRL 7

Demonstrations with Defence and industry

mcsaatchiworldservices.com

TESS project team, left to right: Sebastian Cocks (Machine Learning graduate, SRC Aus), Dr Vichet Duk (Senior Radar Research Engineer, SRC Aus), Richard Button (Technical Director, SRC Aus), Salvador Dreo (Lead – Machine Learning Engineer, SRC Aus), Dr Raja Abdullah (Senior Research Fellow, SRC Aus/Adelaide University).

Trailblazer Electronic Warfare Support System (TESS)

ACCELERATING COMMERCIALISATION OF ELECTRONIC WARFARE CAPABILITY

PROBLEM

Defence is facing evolving real-world challenges in the spectrum warfare battle space, particularly when operating in a complex contested and congested signal space.

SOLUTION

SRC Aus have developed a working prototype of TESS for Australian Defence Force operators. The project is applying research from Adelaide University to develop a Machine Learning-enabled adaptive sensor, and an advanced radar signal processing system that can learn to recognise modern radar systems. The company is now building a compact, transportable version of the system for field test and military environment demonstrations.

CAPABILITY ADVANTAGE

TESS delivers transparency that aligns with ADF Rules of Engagement and new methods for EW support, including signal characterisation, identification and behaviour prediction.

TARGET INDUSTRY

Defence

PROJECT LEADS

Associate Professor Brian Ng
University Chief Investigator
Adelaide University

Richard Button and Dr Vichet Duk
Partner Investigators
SRC Aus

SRC Aus

Adelaide University

Information Warfare & Advanced Cyber Technologies

Project Delivery: December 2026

Project Duration: 36 Months

TRL 6

Trials with Defence and industry

Owned by veteran

srcinc.com/srcaus

Robotics, Autonomous Systems & AI

Biologically Inspired Vision (BIV) technology takes its cues from nature.

Bio-inspired counter uncrewed aerial system

EARLY DETECTION OF DRONES FROM MOVING VEHICLES

PROBLEM

Unmanned Aerial Systems (UAS) or drones are becoming more prominent in battlespaces. In demanding operational environments, optical detection systems are needed to provide early warning of hostile drones.

SOLUTION

Drawing on successful demonstrations by Acacia Systems and the Visual Physiology & Neurobotics Laboratory (VPNL) at Adelaide University, this project will further develop optical detection systems to support early detection of UAS threats, even from moving vehicles. The bio-inspired model can inform methodologies of targeting small fast-moving objects in low light environments, inspired by dragonfly vision. The model is being used to instruct algorithms for UAS detection systems mounted on moving vehicles.

CAPABILITY ADVANTAGE

The early detection system has the potential to outperform other optical detection techniques, providing an earlier warning of hostile drones.

TARGET INDUSTRY

Defence

PROJECT LEADS

Associate Professor Steven Wiederman
University Chief Investigator
Adelaide University

Bill Voss
Partner Investigator
Acacia Systems

ACACIA SYSTEMS

Adelaide University

Robotics, Autonomous Systems & AI

Project Delivery: November 2025

Project Duration: 18 months

TRL 4

TRL 4

Demonstrations with industry

acaciasystems.com.au

HORAS Vision Plus in action.

HORAS Vision Plus

VISION-BASED AI TECHNIQUES TO PRE-EMPT UNCREWED AUTONOMOUS SYSTEM (UAS) MOTION

PROBLEM

Situational awareness and Uncrewed Autonomous Vehicle (UAV) survivability are essential challenges that must be met in both defensive and offensive operations in modern warfare environments.

SOLUTION

This project will focus on expanding the capabilities of Advent Atum's HORAS Threat Detection and Engagement (TDE) system, an AI-powered integrated fire control and threat detection solution, whilst utilising legacy sensor hardware. It will apply state-of-the-art vision-based AI techniques to strengthen the HORAS ecosystem's modular integration across surveillance systems, remote weapon stations, anti-aircraft platforms, and ground-based air-defence systems.

CAPABILITY ADVANTAGE

This project will accelerate the next phase of sovereign counter-UAS innovation in Australia, improving real-time threat response and surveillance operations.

TARGET INDUSTRY

Defence

PROJECT LEADS

Associate Professor Melrose Brown
University Chief Investigator
UNSW Canberra

Andrew Wilson
Partner Investigator
Advent Atum

Advent Atum

UNSW

Robotics, Autonomous Systems & AI

Project Delivery: January 2026

Project Duration: 9 Months

TRL 5

Demonstrations with Defence and industry

adventatum.com

Back row from left: Jim Boekel (Bluerydge Director and CEO), Dr Tim Lynar (UNSW Canberra), Adam Haskard and Thomas Kazan (Bluerydge Directors). Front row: Dr Lisa Liu (postdoctoral research fellow, UNSW Canberra).

Next-Gen AI chatbots enhancing Defence and Healthcare with decentralised intelligence

SOVEREIGN, HIGH-ASSURANCE AI CHATBOT FOR SENSITIVE SECTORS

PROBLEM

Commercial large language models (LLMs) are not optimal for Defence and healthcare operations because they rely heavily on centralised data-processing and cloud-based services. This results in limited data sovereignty and offline functionality.

SOLUTION

Bluerydge and research collaborators from UNSW Canberra have successfully demonstrated a sovereign artificial intelligence chatbot in the SierraBlue project. Designed for use in secure and disconnected environments, SierraBlue is a custom large language model (LLM) purpose-built to support Defence and other sensitive sectors with mission-ready AI capability. The LLM has been trained on bespoke data sources such as intelligence reports, logs and raw databases.

CAPABILITY ADVANTAGE

Product demonstrations showed its capability across a range of operating conditions including mobile tactical deployments and secure data centre infrastructure.

TARGET INDUSTRY

Defence, government, finance and healthcare.

PROJECT LEADS

Dr Timothy Lynar
University Chief Investigator
UNSW

Adam Haskard
Partner Investigator
Bluerydge

BLUERYDGE

UNSW

Robotics, Autonomous Systems & AI

Project Delivery: October 2025

Project Duration: 7 Months

TRL 6

TRL 6

Demonstrations with Defence and industry

bluerydge.com

Testing at the Australian Defence Force Academy (ADFA)

Artificial Intelligence-assisted cognitive load assessment for mission aviators (PHASE 1 AND PHASE 2)

INCREASING PERFORMANCE FOR MILITARY AIRCRAFT CREW

PROBLEM

Mission Aircrew operate some of the world's most sophisticated airborne electronic systems. These personnel work in surveillance and battle management, air combat or maritime patrol and response, in roles demanding high cognitive load. It is unclear whether managing cognitive load can enhance decision making capability.

SOLUTION

CAE Australia and UNSW are developing an assessment system that combines cognitive science, biometrics, and artificial intelligence. The system will integrate innovative tools and learning approaches to support improved mission aircrew performance, reduced time in training, and increased situational awareness of personnel who operate under various levels of cognitive load.

The next phase of the project will expand the pool of study participants to include RAAF aviators and include greater psychological measures of cognitive load.

CAPABILITY ADVANTAGE

The project aims to improve the decision-making of command-and-control personnel in complex operational environments, to make each mission safer and more efficient.

TARGET INDUSTRY

Defence

PROJECT LEADS

Dr Oleksandra Molloy
University Chief Investigator
UNSW

Dr Gary Eves
Partner Investigator
CAE Australia

CAE

UNSW

Robotics, Autonomous Systems & AI

Project Delivery: December 2026

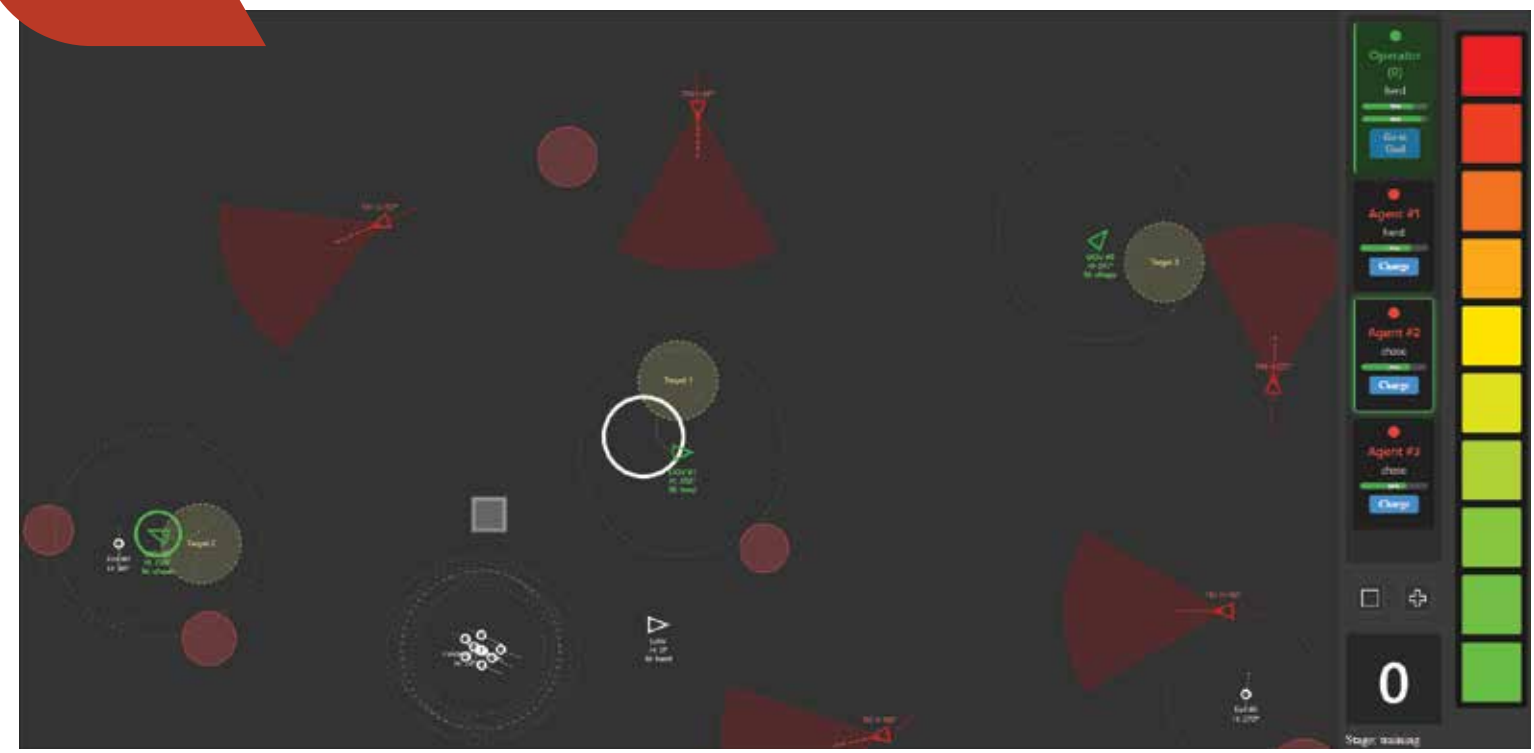
Project Duration for Phase 1 & 2: 40 Months

TRL 7

TRL 7

Procured by Defence

cae.com/defense-security/regional-operations/cae-australia



CAE Training program image

Skill development methodology for operators of artificial intelligence-enabled autonomous systems

TRUSTED TRAINING METHODOLOGY FOR HUMAN MACHINE TEAMING

PROBLEM

As more autonomous systems are adopted by Defence, the ADF will interact and operate systems that will hold different levels of autonomy, requiring different levels of human interaction, operation, and control. This requires training methodologies that consider different contexts, human performance states, and user cognitive load levels.

SOLUTION

CAE Australia and UNSW are developing a training methodology for operators of autonomous systems. The project will identify how to successfully learn to operate and command unmanned systems, covering fundamentals of flight and payload operations, mission planning and rehearsal. It will also deliver analysis that can be implemented in future training programs involving single or swarms of autonomous vehicles.

CAPABILITY ADVANTAGE

The project addresses a critical gap in the training of personnel that are deployed in distributed mission and joint operations.

TARGET INDUSTRY

Defence

PROJECT LEADS

Professor Nadine Marcus and Professor Hussein Abbass
University Chief Investigators
UNSW

Dr Gary Eves
Partner Investigator
CAE Australia

CAE

UNSW

Robotics, Autonomous Systems & AI

Project Delivery: November 2026

Project Duration: 30 Months

TRL 7

Procured by Defence

cae.com/defense-security/regional-operations/cae-australia

Capability mapping within the Cyndr platform, connecting organisations, technologies and funding activity.

Cyndr AI Capability Intelligence Platform

DECISION ADVANTAGE ACROSS THE SOVEREIGN DEFENCE ECOSYSTEM

PROBLEM

Defence organisations operate in a complex ecosystem where key information on capabilities, technologies, funding and research is scattered across many systems and sources. This fragmentation demands heavy manual effort, limits ecosystem visibility, and makes it difficult to align insights with strategic priorities or confidently identify where capability, investment and opportunity intersect.

SOLUTION

Developed in collaboration with UNSW, Cyndr integrates diverse data into an AI-enabled capability intelligence environment aligned to national defence strategy. Using domain-aligned models, AI and knowledge graphs, it exposes validated links between organisations, technologies, projects and funding. This allows users to quickly assess relevance, alignment and maturity, providing traceable insight for faster, more defensible capability decisions.

CAPABILITY ADVANTAGE

Cyndr transforms fragmented ecosystem activity into an explorable and strategically aligned capability view tailored to defence and national security users. It enables decision makers and their teams to trace insight to source, assess confidence and align investment to strategic priorities. The platform is designed to embed within existing planning and evaluation processes to enhance decision advantage without disrupting established workflows.

TARGET INDUSTRY

Defence and national security

PROJECT LEADS

Professor Aditya Joshi
University Chief Investigator
UNSW

Tom Marchant
Partner Investigator
Cyndr

CYNDR

UNSW

Robotics, Autonomous Systems & AI

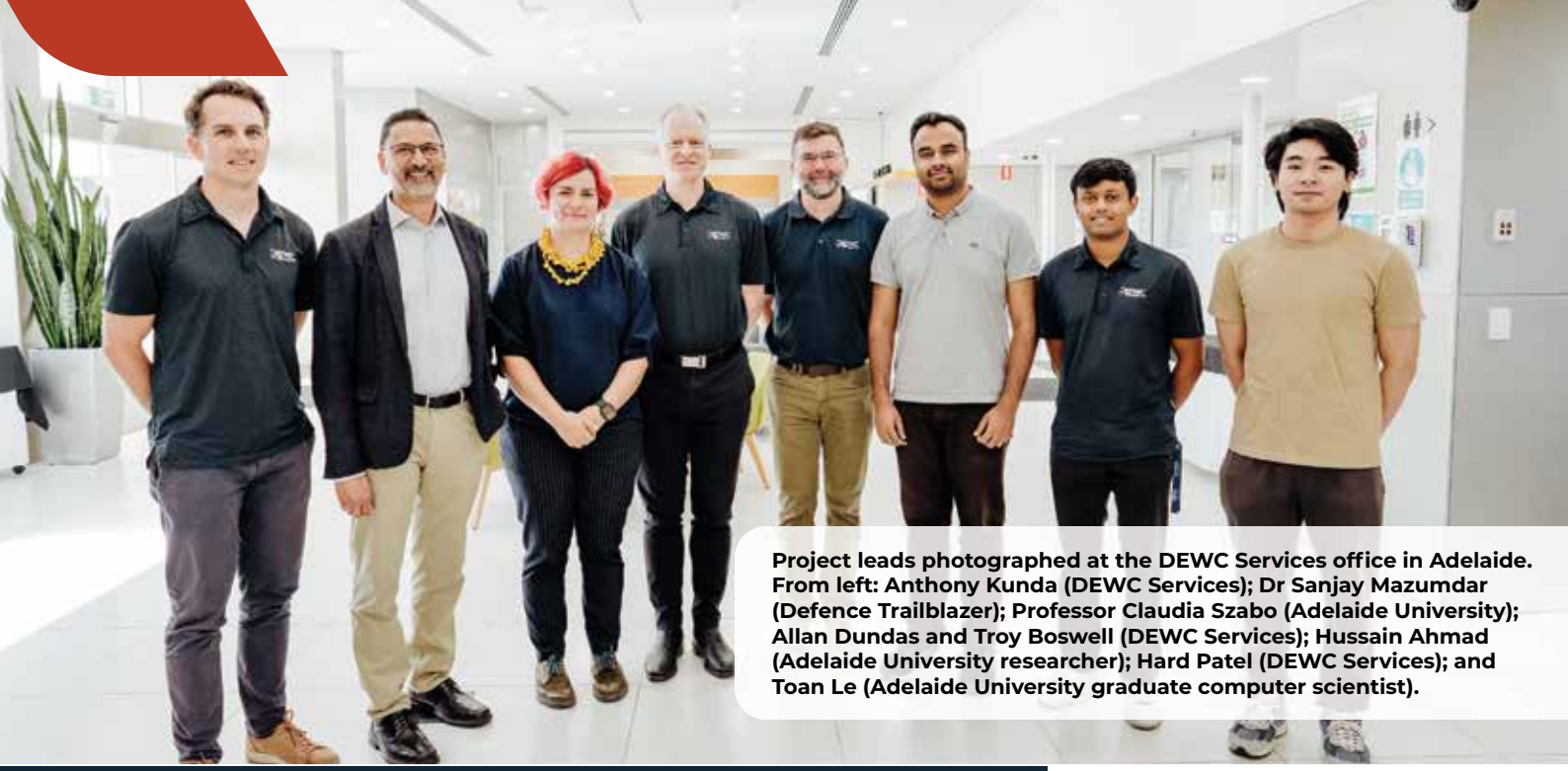
Project Delivery: December 2026

Project Duration: 21 Months

TRL 8

Trials with government & industry

cyndr.ai



Project leads photographed at the DEWC Services office in Adelaide. From left: Anthony Kunda (DEWC Services); Dr Sanjay Mazumdar (Defence Trailblazer); Professor Claudia Szabo (Adelaide University); Allan Dundas and Troy Boswell (DEWC Services); Hussain Ahmad (Adelaide University researcher); Hard Patel (DEWC Services); and Toan Le (Adelaide University graduate computer scientist).

Human-machine partnership with AI agents to enhance decision-making

PRIORITISING INTEROPERABILITY IN DEFENCE OPERATIONS

PROBLEM

Defence users are often required to work across closed vendor-specific systems that do not interoperate effectively. This results in time-consuming manual workflows and places the burden of system integration on personnel rather than software.

SOLUTION

This research collaboration will develop an open vendor-agnostic software architecture to support semi-automated decision-support system, helping to reduce friction in Defence workflows by prioritising interoperability with Defence's current network-centric environment. It builds on UX smart application and AI and Machine Learning concepts incubated by DEWC Services, the Defence Science and Technology Group (DSTG), and other research partners, including Adelaide University.

CAPABILITY ADVANTAGE

A key feature of the architecture is the use of natural language and other skill-agnostic user interfaces, enabling users to rapidly instantiate analysis and processing capabilities based on operational context.

TARGET INDUSTRY

Defence

PROJECT LEADS

Professor Claudia Szabo
University Chief Investigator
Adelaide University

Anthony Kunda
Partner Investigator
DEWC Services

DEWC SERVICES

Adelaide University

Robotics, Autonomous Systems & AI

Project Delivery: February 2027

Project Duration: 18 Months

TRL 6

TRL 6

R&D in progress

Owned by veteran

dewc.com

Anthea Roberts, Dragonfly Thinking

Artificial intelligence tools for strategic decision-making

AI-BASED SYSTEMS APPROACH TO POLICY MAKING

PROBLEM

Policymakers navigate complex issues – be it implementing reforms or achieving sustainability, and the techniques behind the decision can be as complex as the problems they are designed to solve.

SOLUTION

Dragonfly Thinking's AI tools provide decision-support for businesses and policymakers dealing with complex, interconnected problems. This project incorporates the research expertise at the Australian Institute of Machine Learning (AIML) to improve the AI analytic capabilities of the tools.

CAPABILITY ADVANTAGE

Specifically designed to aid intelligence analysis and strategic decision-making, the tools can be applied to custom document sets and leverage multi-agent agentic workflows to improved complex decision-making.

TARGET INDUSTRY

Government, Defence and private sector.

PROJECT LEADS

Dr Greg Ruthenbeck
University Chief Investigator
Australian Institute for Marchine Learning (AIML),
Adelaide University

Anthea Roberts
Partner Investigator
Dragonfly Thinking

DragonflyThinking

Adelaide University

Robotics, Autonomous Systems & AI

Project Delivery: February 2026

Project Duration: 15 Months

TRL 7

TRL 7

Demonstrations with Defence

Spin-out

dragonflythinking.net

Two of EMP's electric motors, made in Australia at EMP's advanced manufacturing facilities.

High performance Electric Motors for autonomous vehicles and aerospace sector

SECURING A SUSTAINABLE SOVEREIGN SUPPLY CHAIN

PROBLEM

Current electric motors (EMs) have a large environmental impact – the materials used result in heavy motors with low efficiency and high emissions. Additionally, many SMEs are reliant on foreign based and foreign owned EMs in their manufacturing processes, leaving them vulnerable to supply chain issues.

SOLUTION

Electric Motor Power (EMP) is collaborating with researchers from Adelaide University to develop high performance and sustainable EMs for autonomous electric vehicles. This project will integrate advanced materials – such as amorphous magnetic materials and soft magnetic composites – into EM design to enhance efficiency, power density and sustainability.

CAPABILITY ADVANTAGE

The approach will create lighter, more efficient, and eco-friendly motors and secure a sovereign supply chain.

TARGET INDUSTRY

Defence, autonomous and electric vehicles, marine applications and aerial systems.

PROJECT LEADS

Associate Professor Wen Soong
University Chief Investigator
Adelaide University

Charles Matheou
Partner Investigator
Electric Motor Power

ELECTRIC MOTOR POWER

Adelaide University

Robotics, Autonomous Systems & AI

Project Delivery: December 2026

Project Duration: 18 Months

TRL 7

TRL 7

R&D in progress

emppl.com

Ocius Bluebottle USV fleet.

Integrated facility design for production, maintenance, and management of Uncrewed Surface Vessels

SCALING UP USV PRODUCTION WITH AI

PROBLEM

Conventionally powered Uncrewed Surface Vessels (USVs) are limited in how long they can remain at sea and have environmental impacts.

SOLUTION

Ocius Technology and UNSW Canberra are partnering on a project to increase the rapid scaling of production of its Bluebottle USV fleet for the Royal Australian Navy. The Bluebottle fleet offers economic and operational advantages over conventional USVs, with greater power, payload and performance compared to known competitions. The project is developing an integrated production and maintenance facility and an Artificial Intelligence (AI)-powered logistics support framework.

CAPABILITY ADVANTAGE

Continued acquisition of Ocius USVs will support the RAN's Anti-Submarine Warfare and its Intelligence, Surveillance, and Reconnaissance operations.

TARGET INDUSTRY

Maritime Defence

PROJECT LEADS

Dr Ripon K. Chakrabortty
Lead Chief Investigator
UNSW

Nick Rozenauers
Partner Investigator
Ocius

OCIUS

UNSW

Robotics, Autonomous Systems & AI

Project Delivery: September 2026

Project Duration: 12 Months

TRL 9

TRL 9

Procured by Defence

ocius.com.au

Left to right: Dr Margaret Law, Hamish Earl (Defence Trailblazer), Brett Hill (Praetorian Aeronautics), Associate Professor Claudia Szabo (Adelaide University), Dr Sanjay Mazumdar (Defence Trailblazer)

Artificial Intelligence-enabled systems to counter drone swarms

AUTONOMOUS COUNTERMEASURE PLATFORM FOR MODERN DRONE DEFENCE

PROBLEM

Low-cost, swarm-capable Unmanned Aerial Systems (UAS) pose an increasing threat to assets and infrastructure. They can overwhelm legacy defence systems, particularly in contested and GPS-denied environments.

SOLUTION

Praetorian Aeronautics and Adelaide University are countering these threats with CEREBRUM, an advanced AI-enhanced system that can rapidly detect and defend against swarm-capable UAS with autonomous decision making. It rapidly integrates and processes data from air, ground, and maritime sensors using multi-agent reinforcement learning techniques.

CAPABILITY ADVANTAGE

Developed to accurately detect, classify, and prioritise complex moving threats before formulating the most effective swarming countermeasures, CEREBRUM's automated capabilities significantly reduce the sensor-to-effector cycle and operator workload.

TARGET INDUSTRY

Australian Defence Force and allies.

PROJECT LEADS

Professor Claudia Szabo
University Chief Investigator
Adelaide University

Brett Hill
Partner Investigator
Praetorian Aeronautics

PRAETORIAN AERONAUTICS

Adelaide University

Robotics, Autonomous Systems & AI

Project Delivery: December 2026

Project Duration: 24 Months

TRL 7

TRL 7

Demonstrations with Defence and industry

praetorian-aeronautics.com

Praetorian Aeronautics Arrow Interceptor in flight.

AI-Enhanced Counter-UxS Interceptor and Battle Management Systems

AI-ENABLED C-UAS SYSTEM

PROBLEM

Low-cost, autonomous unmanned systems (UxS) present an urgent and rapidly expanding threat across military, security, and critical infrastructure environments, and have demonstrated the ability to overwhelm conventional air defence architectures.

SOLUTION

Praetorian Aeronautics and Adelaide University are developing autonomous counter-UxS interceptors and the HADRIAN battle management system, which will provide a cost-effective defence against small and medium-sized drone threats. The project includes the prototyping of low-cost, autonomous interceptors leveraging the integration of high-TRL commercial subsystems.

CAPABILITY ADVANTAGE

Low unit cost, advanced autonomy, and high-performance interceptors deliver projectable area defence. HADRIAN's sensor agnostic architecture and streamlined interface enable operators to respond faster to threats, while interceptor autonomy removes the need for pilot control, enabling scalable deployment against massed attacks.

TARGET INDUSTRY

Australian Defence Force and allies.

PROJECT LEADS

Dr Feras Dayoub
University Chief Investigator
Adelaide University

Brett Hill
Partner Investigator
Praetorian Aeronautics

PRAETORIAN AERONAUTICS

Adelaide University

Robotics, Autonomous Systems & AI

Project Delivery: April 2027

Project Duration: 24 Months

TRL 7

TRL 7

Demonstrations with Defence and industry

praetorian-aeronautics.com

Render of Venator pursuing a USV

Venator Unmanned Autonomous Multi-Role ISTAR Mothership

AUTONOMOUS MOTHERSHIP UAS FOR EXTENDED-RANGE MULTI-ROLE MISSIONS

PROBLEM

Defence faces a critical capability gap in Intelligence, Surveillance, Target Acquisition, and Reconnaissance (ISTAR) drones that bridge the gap between small tactical Unmanned Autonomous Systems and larger, high-cost platforms. Existing systems are often optimised for a single mission set, limiting operational flexibility.

SOLUTION

Praetorian Aeronautics and Adelaide University are developing Venator, a cost-effective autonomous UAS platform designed for ISTAR and multi-role operations, capable of acting as a mothership to deploy smaller effects, including Praetorian's C-UxS interceptors.

CAPABILITY ADVANTAGE

Modular airframe and payload architecture enables cost-effective evolution and multi-mission use. High-performance flight reduces time to target, while autonomous operation enables persistent missions without human fatigue. Short take-off and landing capability supports deployment from austere and constrained environments.

TARGET INDUSTRY

Australian Defence Force and allies.

PROJECT LEADS

Professor Claudia Szabo
University Chief Investigator
Adelaide University

Brett Hill
Partner Investigator
Praetorian Aeronautics

PRAETORIAN AERONAUTICS

Adelaide University

Robotics, Autonomous Systems & AI

Project Delivery: December 2026

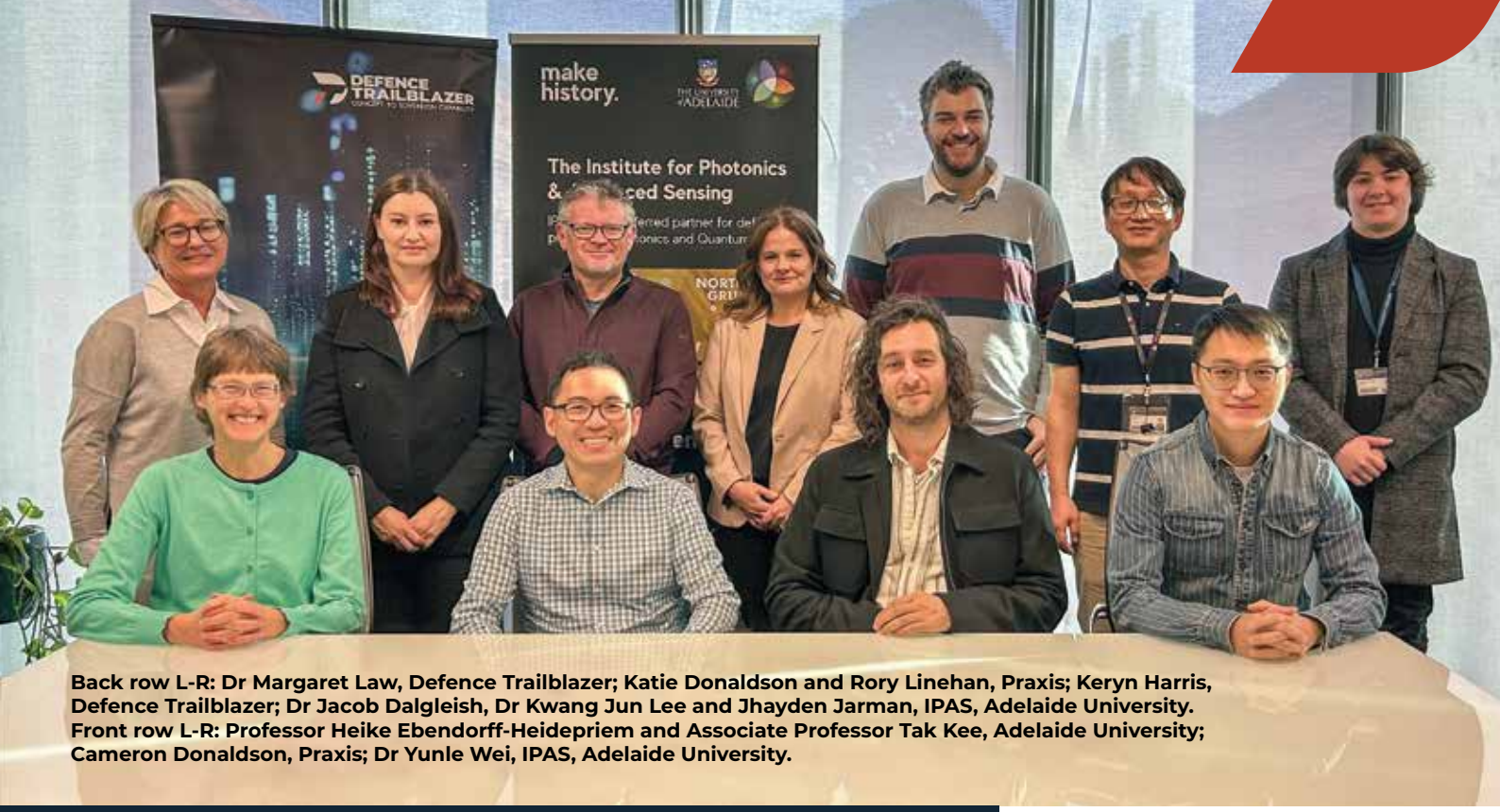
Project Duration: 20 Months

TRL 6

TRL 6

Demonstrations with Defence and industry

praetorian-aeronautics.com



Back row L-R: Dr Margaret Law, Defence Trailblazer; Katie Donaldson and Rory Linehan, Praxis; Keryn Harris, Defence Trailblazer; Dr Jacob Dalgleish, Dr Kwang Jun Lee and Jhayden Jarman, IPAS, Adelaide University. Front row L-R: Professor Heike Ebendorff-Heidepriem and Associate Professor Tak Kee, Adelaide University; Cameron Donaldson, Praxis; Dr Yunle Wei, IPAS, Adelaide University.

Camouflage Tactical Solar Modules

ENERGY RESILIENCE FOR THE COMBINED-ARMS LAND SYSTEM AND AUTONOMOUS SYSTEMS

PROBLEM

Transitioning to renewable energy is an increasing Defence priority to achieve power independence, resilience and redundancy. Solar is well suited for this application but still needs to be integrated into Defence CONOPS including the need for 'camouflage solar' for covert operations.

SOLUTION

Praxis and the Institute for Photonics and Advanced Sensing (IPAS) at Adelaide University are developing the next generation of high performance camouflage photovoltaic solar modules. These composite solar modules are durable, lightweight and have been demonstrated to withstand the harshest environments. The project supports the development of advanced solar composites within Australia, enhancing our sovereign manufacturing capability.

CAPABILITY ADVANTAGE

The new solar modules are suitable for a wide range of crewed and uncrewed applications across land, sea and air. Camouflage solar offers extended mission duration, reduced visual signature and resilience for battery-electric powered applications.

TARGET INDUSTRY

Defence, advanced materials.

PROJECT LEADS

Professor Heike Ebendorff-Heidepriem
A/Professor Tak Kee
Dr Yunle Wei
University Chief Investigators
IPAS, Adelaide University

Cameron Donaldson
Partner investigator
Praxis

PRAXIS

Adelaide University

Robotics, Autonomous Systems & AI

Project Delivery: March 2026

Project Duration: 12 Months

TRL 3

Demonstrations with industry

praxis-solar.com

The QuantX team working on the magnetometer.

Magnetometer Neural Network

HIGHLY ACCURATE SENSORS FOR THREAT AWARENESS

PROBLEM

New types of surveillance such as magnetometry can detect objects in areas that are inaccessible to traditional methods such as underground and underwater. However, a complex and dynamic background of environmental and platform noise can obscure the signals of interest.

SOLUTION

QuantX Labs with the Australian Institute of Machine Learning (AIML) are combining quantum sensing with recent advances in Artificial Intelligence (AI) to develop a physics informed neural network for sensing applications. By embedding the underlying physical equations in the training of the neural network it can more effectively discriminate environmental and platform noise to reveal the underlying signatures. A stage approach will be taken to increase the complexity of simulated and real data to benchmark the performance of the neural network.

CAPABILITY ADVANTAGE

New AI methods can allow the detection and tracking of objects at greater ranges in complex environments.

TARGET INDUSTRY

Defence

PROJECT LEADS

Dr Hemanth Saratchandran
University Chief Investigator
Adelaide University

Dr Fred Baynes
Partner Investigator
QuantX Labs

QUANTX LABS

Adelaide University

Robotics, Autonomous Systems & AI

Project Delivery: February 2027

Project Duration: 24 Months

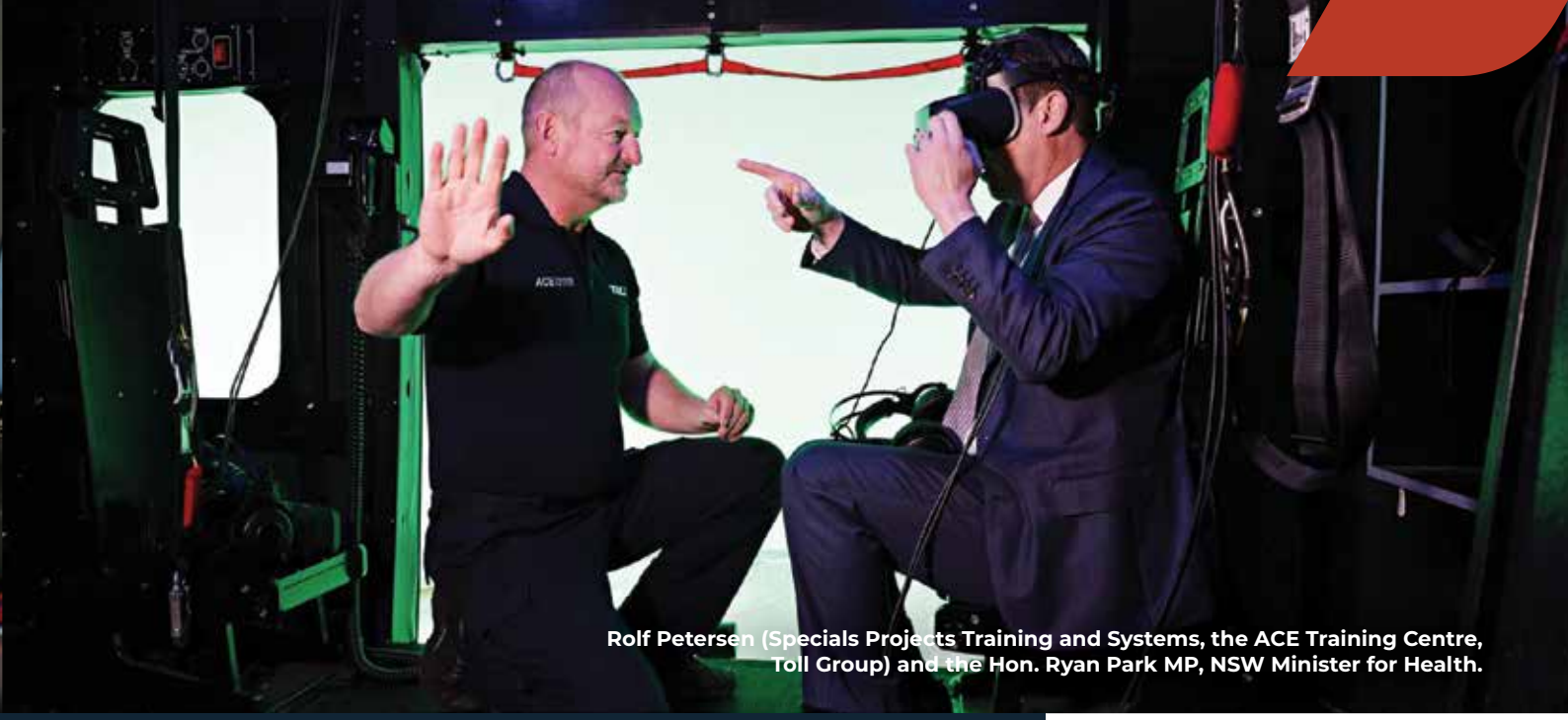
TRL 4

TRL 4

R&D in progress

Spin-out

quantx.com.au



Rolf Petersen (Specials Projects Training and Systems, the ACE Training Centre, Toll Group) and the Hon. Ryan Park MP, NSW Minister for Health.

Mixed reality simulation helmet systems for ADF and civilian training

COST-EFFECTIVE AND SCALABLE IMMERSIVE TRAINING SOLUTIONS

PROBLEM

Current 3D virtual training systems are costly, with long lead times for development or modification. Existing virtual reality (VR) and mixed reality (XR) headset-based training systems cannot be integrated with standard issue helmets or other headwear, and they lack realistic communications and night vision capabilities.

SOLUTION

The ACE Training Centre, part of Toll Group Government and Defence, and UNSW are developing an advanced mixed reality helmet-based training system that builds on Texisting training hardware. The project will create a compatible helmet display system that seamlessly integrates with current advanced XR Head Mounted Displays, and communication capabilities.
It will also develop a virtual environment to train operators for both day and night missions, aided with in-service Night Vision Systems.

CAPABILITY ADVANTAGE

Equipped with robust communication capabilities and a night vision imaging system, it will enable any ADF helmet to be used as a relatively low cost virtual and mixed simulation system.

TARGET INDUSTRY

Defence and civilian training systems, including aviation, warehousing, mining and construction.

PROJECT LEADS

Professor John McGhee
University Chief Investigator
UNSW

Rolf Petersen
Partner Investigator
The ACE Training Centre

ACE TRAINING CENTRE | TOLL

UNSW

Robotics, Autonomous Systems & AI

Project Delivery: June 2026

Project Duration: 12 Months

TRL 8

Demonstrations with Defence

Employs veterans

acetrainingcentre.com.au

Defence Materials

The UndaTech fire-safe bra.

Testing of undergarments for Australian Defence Force

FIRE-RESISTANT, HIGH-PERFORMANCE UNDERGARMENTS DESIGNED FOR WOMEN IN DEFENCE

PROBLEM

While outer PPE has advanced, base layers remain flammable, poorly fitted and incompatible with uniforms and equipment, creating avoidable safety and performance risks. Women are disproportionately affected by the absence of purpose designed products for breast support and menstruation management, increasing hazard exposure and capability gaps.

SOLUTION

UndaTech has developed advanced next-to-skin protective systems for women in high-risk environments. The inherently fire-resistant fabric was independently tested and validated by UNSW researchers, with the garments engineered for seamless integration with existing protective equipment to enhance safety and performance.

CAPABILITY ADVANTAGE

Addresses a critical vulnerability within the protective ensemble by improving anatomical fit and fire protection at the next to skin layer, strengthening force protection, reducing injury risk and enhancing operational performance on the frontline.

TARGET INDUSTRY

Defence, emergency services, industrial sectors (mining, energy and resources, construction, oil and gas), search and rescue, and border force.

PROJECT LEADS

Dr Imrana Kabir
Lead Chief Investigator
UNSW

Emily Pyke
Partner investigator
UndaTech

undatech

UNSW

Defence Materials

Project Delivery: May 2026

Project Duration: 12 Months

TRL 7

Trials with Defence and industry

Owned by veteran

undatech.com.au

Combined Capability

LOCKHEED MARTIN
AUSTRALIA

Advanced Systems & Technologies (AST) R&D team at Lockheed Martin Australia.

Path to capability

Lockheed Martin Australia through its Advanced Systems & Technologies (AST) R&D team is making an impact in systems-level R&D architecture through five projects supported by the Defence Trailblazer. In collaboration with researchers at UNSW and the University of Adelaide, the projects are designed to rapidly deliver new sovereign technologies for Defence hypersonics, counter-hypersonics, and space-related capabilities.

Dr Sanjay Mazumdar, Executive Director at Defence Trailblazer, said of the projects: “We are proud to support Lockheed Martin Australia in delivering advanced, transformative operational capabilities. This suite of collaborative projects will bring momentum for advanced hypersonics and space sensing technologies to Defence.”

LOCKHEED MARTIN AUSTRALIA

PROJECT 1

Sovereign rapid aerodynamic design tools

SOLUTION

Lockheed Martin Australia and UNSW are developing a method to rapidly predict aerodynamic and thermal performance data for hypersonic vehicle geometries.

Through Computer Aided Design (CAD) modelling of hypersonic glide vehicle geometry, the project will analyse and assess prediction methods (including analytical, computational and machine learning methods).

Project Delivery:
October 2024

Project Duration:
12 Months

UNSW

PROJECT 2

Aerothermal shape distortion of hypersonic vehicles

SOLUTION

As an extension of existing collaborative research on hypersonics, Lockheed Martin Australia and UNSW are further exploring simulation frameworks to understand the influence of aerothermal shape distortion on hypersonic geometries. By identifying potential risks with structural degradation or failure, the project will provide insights and tools for future hypersonic vehicle design, performance and safety enhancements.

Project Delivery:
December 2026

Project Duration:
38 Months

PROJECT 3

Hypersonic flight testbed concept

SOLUTION

This design study builds on research by Lockheed Martin Australia and UNSW to progress the design of Common Front End (CFE) flight testbed concept. This research provides a path to flight test verification of the outcomes from the R&D developing analytic design tools. The overall goal is to develop a hypersonic flight testbed capability that can be used to accommodate multiple experiments and provide greater access to flight testing opportunities to increase the pace of hypersonic and countermeasures technology development for the benefit of Australian Defence and associated industry.

Project Delivery:
December 2025

Project Duration:
18 Months

PROJECT LEADS

Professor Andrew Neely
University Chief Investigator
UNSW

Dr Scott Beinke
Partner Investigator
Lockheed Martin Australia

Defensive Hypersonics & Countermeasures

LOCKHEED MARTIN AUSTRALIA

Defence Space Technologies

Adelaide University

UNSW

Adelaide University

PROJECT 4

Extreme Artificial Intelligence for Space Missions

SOLUTION

Lockheed Martin Australia in collaboration with Adelaide University's AI for Space Group is developing and integrating sovereign advanced sensing and associated automated information workflows in the context of space-based hypersonic vehicle detection and tracking.

This complex system addresses decision-making under harsh operating conditions and time constraints, requiring algorithms that are efficient and cost-effective.

The project will foster "Extreme AI" through developing AI-inspired techniques that can meet the practical challenges of extremely time-compressed detection and decision timelines.

Project Delivery:
April 2026

Project Duration:
18 Months

PROJECT LEADS

Professor TJ Chin
University Chief Investigator
Adelaide University

Dr Tim Payne
Partner Investigator
Lockheed Martin Australia

PROJECT 5

Space Layer Optimisation

SOLUTION

To support integrated Air and Missile Defence, LMA and UNSW are collaborating on a Space Layer Optimisation project increasing sovereign capability to rapidly design and assess satellite constellations, for the purposes of demonstrating the dynamic utilisation of space-based assets as part of the integrated, all-domain system.

The Space Layer Optimisation project is developing the methodology and software tools for design and performance assessments of satellite constellations, but optimised for integration with other all-domain tools required for end-to-end capability assessment.

Project Delivery:
April 2026

Project Duration:
16 Months

PROJECT LEADS

Dr Melrose Brown
University Chief Investigator
UNSW

Luke Tracey
Partner Investigator
Lockheed Martin Australia

PROJECT 6

Space Domain Awareness on the Edge

SOLUTION

Lockheed Martin Australia's FireOPAL space surveillance system consists of commercial optical sensors strategically placed to monitor the night sky. However, the signal-to-noise (SNR) ratio of the sensors is limited, which hampers the detection of more distant resident space objects (RSOs). Better understanding RSO population is key to ensuring the safe utilisation of space.

In collaboration with Adelaide University, this project aims to overcome the low SNR of optical sensing using machine learning methods. Another objective is to raise the computational efficiency of the data processing for deployment on edge compute devices, as on-satellite space surveillance provides a complement to ground-based systems such as FireOPAL.

Project Delivery:
January 2027

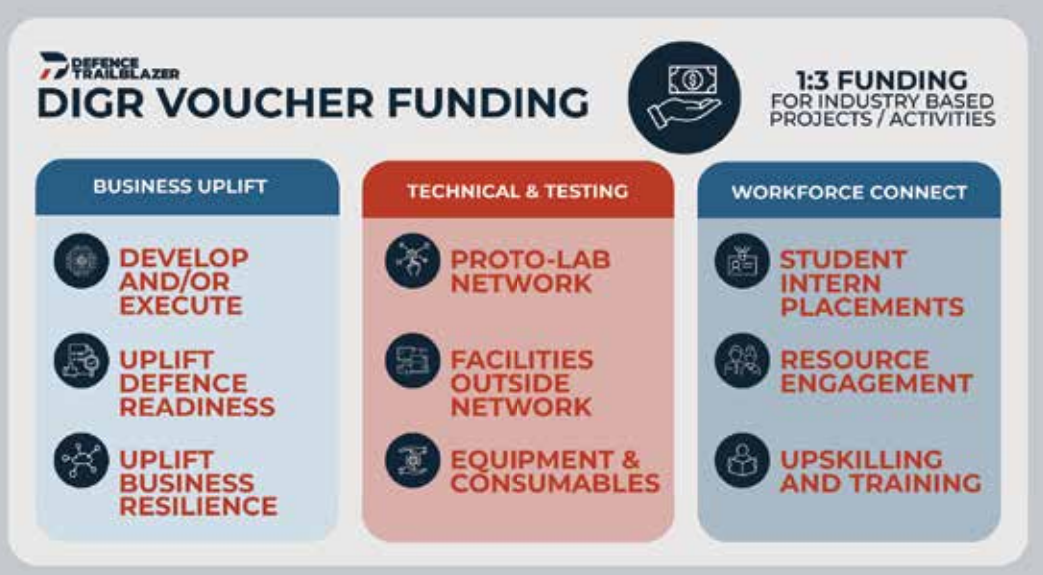
Project Duration:
18 Months

PROJECT LEADS

Professor TJ Chin
University Chief Investigator
Adelaide University

Dr Tim Payne
Partner Investigator
Lockheed Martin Australia

The Defence Industry Growth & Resilience Program



The Defence Industry Growth & Resilience (DIGR) Program supported 40 Defence Trailblazer industry partners with a total of $3 million grant funding to support $14.9 million worth of projects and activities to help businesses to scale and compete to deliver sovereign capability to our Australian Defence Force and potentially our allies.

The program supported projects or activities conducted within the business through three streams:

1. Business Uplift
2. Technical & Testing
3. Workforce Connect

In the business uplift stream, businesses have used these grant funds to support projects such preparing export market strategies, cybersecurity initiatives, upgrading DISP membership, and R&D strategies.

Businesses successful in the Technical and Testing stream aim to grow by investing in product development through further product testing and validation using universities equipment and facilities and Proto-Lab Network.

Seven of the successful DIGR businesses have now employed 9 new FTE staff as part of the Workforce Connect stream. This has resulted in a direct mobilisation of UNSW, UoA, TAFE students and graduates, and veterans into the defence industry.

SUPPORTED INDUSTRY PARTNERS

ACACIA SYSTEMS · AUSCO GROUP · CLEARD LIFE · CYNDR · DefenSight · ecoJet ENGINEERING · ELECTRO BASE · FIVECAST · Ghost Fire Systems · GuardWare · Halcyon Technologies · hullbot · M&C SAATCHI WORLD SERVICES · NanoCube · NAUTIC TECHNOLOGIES · OCIUS · PANOP · PRAETORIAN AERONAUTICS · priori analytica · QUANTX · REACH ROBOTICS · SAAB · SEITEC · Silicon Quantum Computing · solalinx · SRC Aus · Stratoship · TAIPAN TECHNOLOGIES · ACE TRAINING CENTRE · TOLL · undatech · VIDEN · Zendir

OUR IMPACT

229

uplift activities totalling $39M with 101 industry partners across 10 programs

28

defence industry-led PhD & Masters research projects

107

students placed in paid internships with 39 industry partners

13

academics seconded to industry

290+

learners upskilled through Defence Trailblazer short courses and IP Masterclasses

26

Cyber Security Voucher Program (CSVP) vouchers for SMEs

355+

Innovators supported

$28+ million

raised to support Defence Trailblazer ventures

Defence Trailblazer Workforce, Innovation & Culture Programs

WORKFORCE DEVELOPMENT, INNOVATION ACCELERATION, AND CULTURE TRANSFORMATION INITIATIVES

Alongside R&D collaborations with industry partners, the Defence Trailblazer aims to strengthen Australia's sovereign defence capabilities through:

- enhanced collaboration between industry, government and academia across research, innovation and education
- accelerated delivery of innovative sovereign capabilities
- education offerings that harness university strengths and meet industry workforce needs now and into the future.

In collaboration with industry, academic and government partners, Defence Trailblazer is supporting more than 200 collaborative activities with 97 partners across 10 programs, including:

1. Student-focused Workforce Upskilling and Talent Attraction Initiatives (p 58)
2. Staff Mobility opportunities designed to accelerate industry capability development (p 74)
3. Industry-Aligned Professional Education and Cyber Security Uplift (p 76)
4. The DINAMIC Innovation Program: a unique and integrated innovation program for defence and dual-use innovators from Defence, academia or industry (p 78)
5. A collaborative Research Program design to assess the outcomes and impact of Defence Trailblazer's work and identify sustainable institutional reform recommendations (p 89).

Workforce Upskilling and Talent Attraction Initiatives

The National Defence Strategy and Defence Industry Development Strategy both identify "Workforce is at the heart of industrial capability needed for National Defence" and that delivering the workforce to meet Defence's needs requires new approaches.

The Defence Trailblazer has actively contributed to this agenda by developing new education pathways to address industry's workforce needs, and enhancing the culture of collaboration between industry, defence and academia.

The Defence Trailblazer's workforce programs are boosting the capabilities of Australia's defence industry workforce with programs targeting students, researchers and defence industry professionals. Our workforce programs have mobilised hundreds of students and academics to work in defence industry, accelerating research translation and uplifting industry capabilities.

DEFENCE TRAILBLAZER HAS:

Sponsored 28 defence industry-led PhD and Masters research projects

Facilitated 107 student industry internships

Coordinated industry site visits and career events for university students and staff

Enabled industry-academia secondments through our Staff Mobility Program

Partnered with industry to co-design and deliver industry-aligned short courses in photonics and combat systems engineering

Boosted cyber capability for Australian SMEs

Industry Research Program

The Defence Trailblazer Industry Research Program is currently supporting 28 high-calibre PhD and Masters students undertaking industry-led research projects in collaboration with 18 industry partners.

The program provides industry co-funded scholarships of at least $50k per annum, together with academic supervision, industry mentorship and an on-site internships to strengthen research capability and build deep, industry-relevant expertise. Selected candidates also participated in Operation Thesis, presenting their work and highlighting innovative outcomes emerging from the program.

ACACIA SYSTEMS · Advent Atum · CAE · diraq · ENDEAVOUR AEROSPACE · FIVECAST · HB11 ENERGY · INOVOR TECHNOLOGIES · NORTHROP GRUMMAN · phase · PRAETORIAN AERONAUTICS · QUANTX LABS · SAAB · Silanna Group · SRC Aus · TERAGLO · Zendir

TESTIMONIAL

ACACIA SYSTEMS · Adelaide University

"My PhD project will develop, evaluate and recommend algorithms to successfully track multiple targets, particularly in maritime tracking scenarios. In particular, verifying assumptions about the Gaussianity and linearity of the underlying target distribution, as well as the choice of coordinate system are critical.

The Defence Trailblazer program has offered me a unique chance to research intriguing topics with direct and known real-world applications. So far, I've been able to publish my work in a high-quality journal, engage directly with people in the industry and learn from their experience, and elevate my programming abilities."

Athena Xiourouppa, PhD (Statistics and Applied Mathematics), Adelaide University

TESTIMONIAL

NORTHROP GRUMMAN · UNSW

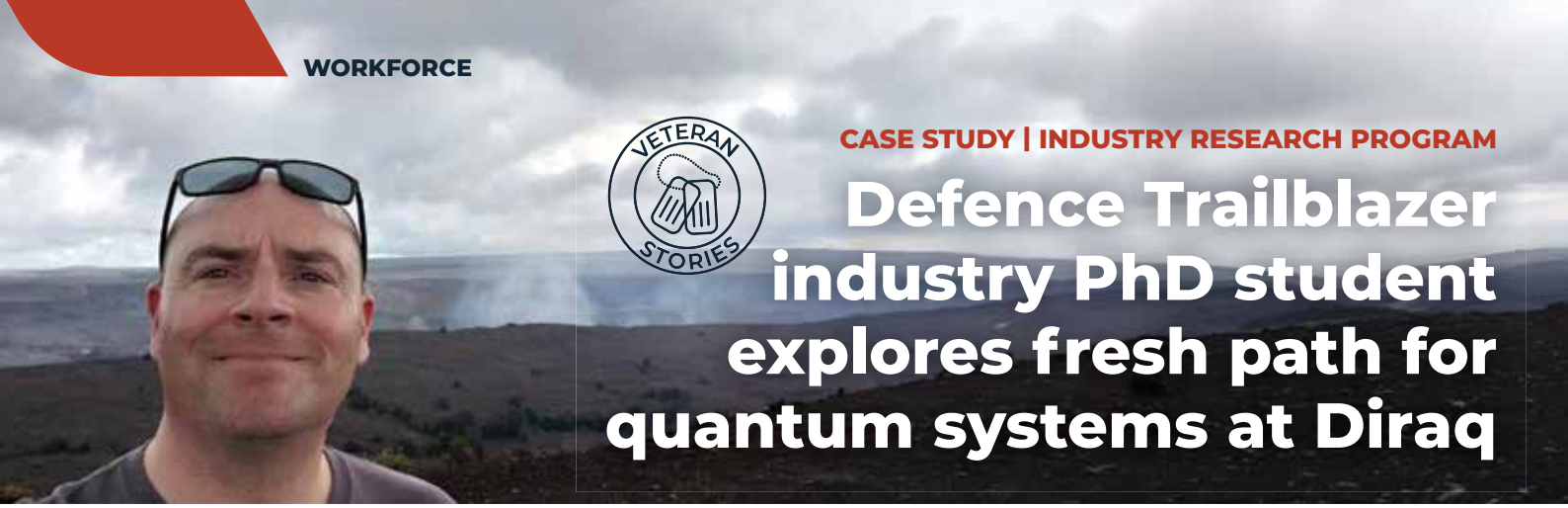
"My project aims to develop a prototype quantum communication system that will eventually be used to communicate with low earth orbit satellites.

Throughout my PhD, I have developed the ability to plan, prepare, and execute a research project with a clear industrial perspective.

The Defence Trailblazer events have allowed me to build valuable professional connections, and to gain insight into industry demands.

My research has definitely encouraged me to consider future engagements with defence industry."

Aman Gupta PhD (Electrical Engineering) Quantum Communications, UNSW



CASE STUDY | INDUSTRY RESEARCH PROGRAM

Defence Trailblazer industry PhD student explores fresh path for quantum systems at Diraq

At Defence Trailblazer, we're committed to strengthening pathways between academia and industry – including at the early career researcher level.

UNSW PhD student Richard Rademacher began his postgrad studies in electrical engineering after working for nine years in the US military as a research engineer in Radar, Communications, and Aircraft design.

"Coming from a Defence background, I learned the value of technology readiness levels, and the importance of all the different avenues for developing laboratory ideas into viable, reliable, accurate products," says Richard.

Now Richard is focused on applying his skills to the growing quantum computing industry. His PhD project with industry partner Diraq aims to expand knowledge of modelling and simulation of silicon spin qubit quantum computers.

"Diraq is working to build at-scale quantum computers," says Richard. "Over the course of my study, I've learned state-of-the-art metrology of semiconductors, and deep fundamental theory unique to spin quantum systems. I have an appreciation for how much progress has been accomplished, and realistic understanding of what's still to be done."

"I appreciate the opportunity to tackle smaller challenges that often don't make the research journals, such as integration with a manufacturing pipeline, product yields, reliability, and field-environment robustness."

Richard is making the most of the industry and university facilities and expertise. "The Defence Trailblazer industry PhD program has been invaluable to me. "My academic supervisors have been excellent, and the industry partnership with Diraq has given me access to the kind of cutting-edge designs and experimental data that simply isn't available to a student on their own."

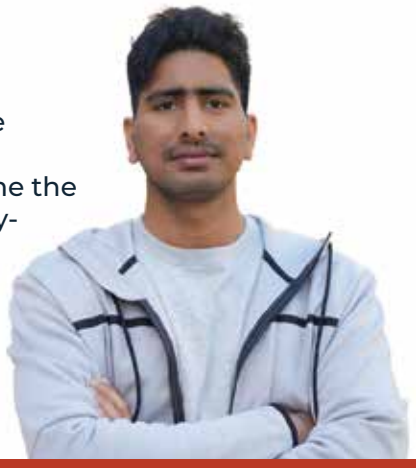
Diraq has grown from a UNSW spin-out company to become world leaders in building quantum processors. Over the next ten years, Diraq plans to progress from prototypes to working silicon quantum processor chips.

Dr Andre Saraiva, Richard's industry supervisor at Diraq, remarked: "Rich is a rare student who blends deep industry experience with academic ambition." "Diraq benefits not only from his technical expertise but also from the fresh, practice-driven perspective he brings to research—opening paths our team alone might not see. His PhD is a true two-way learning journey."

TESTIMONIAL

"My industrial PhD focuses on the free-space quantum communication domain, with a particular focus on quantum time transfer and high-precision clock synchronization. The benefits of this research can be seen in military, finance, trading, Position, Navigation & Timing (PNT), and quantum applications.

Through this program, I have gained the ability to execute projects efficiently. It gives me the opportunity to meet industry-research expectations and deliver technology to Defence and the world."



Ravi Singh Adhikari, PhD (Electrical Engineering)
Quantum Communications, UNSW

TESTIMONIALS

"My project aims to understand the key properties and enhance the performance of alternative composite rocket propellants, ultimately supporting the broader goal of establishing domestic production.

Through this program, I have gained technical expertise and soft skills, particularly critical thinking, problem-solving, and effective communication with both academic researchers and industrial teams – broadening my future perspectives significantly. Working on a defence project has provided me with a deeper understanding of the industry's challenges and innovation needs. This exposure has definitely encouraged me to consider future opportunities within the defence sector, especially in the areas of defence energetics and materials science."

Nana Thi Nguyen, PhD (Chemical Engineering), UNSW

"My PhD investigates trajectory tracking control of rocketry systems for improving Australian sovereign aerospace capability. Endeavour Aerospace industry experts have provided crucial insights in their supervision of my work. This has helped me gain skills in project management, rocket development software, advanced control theory, rocket physics and mathematics.

Working with the industry partner has enabled the capacity to extend the demonstration of my autopilots on physical rocket systems with launch demonstrations. This would not have been possible without the support of Endeavour Aerospace."

Lachlan Gilroy PhD (Electrical Engineering), UNSW

CASE STUDY | INDUSTRY RESEARCH PROGRAM

Exploring autonomous swarms for the detection of underwater objects

Saab Australia has partnered with the Defence Trailblazer under the Industry Research Program, providing a scholarship pathway for a young professional to complete a PhD jointly supervised by staff from Adelaide University and Saab.

Chung Fang, a PhD candidate from the University of Adelaide, is now working with Saab Australia to research how large-scale swarms can assist difficult underwater missions with their ability to cover a larger sea area, sense more objects, and do this at a lower cost than traditional crewed assets.

Under this project, Chung will explore the use of autonomous swarms to create an underwater communications network using decentralised decision support systems, with acoustic signal detection using machine learning. In the maritime environment, one particular advantage of using swarms of uncrewed vehicles is the ability to exploit multiple signal pathways, which can potentially improve sensing performance (through both redundancy and sensor fusion). However, there are also challenges associated with the communications and control requirements for these types of multi-agent systems.

Saab's global experience with underwater systems aligns with the strategic priorities of the Australian Defence Force, and their pursuit of RAS-AI capability. Directly linking Saab's expertise in developing autonomous underwater systems with Australia's research capabilities will fast track innovation and ensure Australia develops a technological advantage.

Chung is focusing on identifying research gaps, guided by Saab Australia, and also investigating modelling approaches to improve signal processing methods.

The results of this research will be dual-use. Along with initial defence applications, we expect to be able to share the technology for environmental purposes. For example, utonomous monitoring for marine preservation, and to detect invasive species of starfish.

Summary of Industry Research Projects

Our industry-led research portfolio spans critical capability domains, including defensive hypersonics and countermeasures, information warfare and cyber, quantum technologies, RAS–AI integration and space systems.

Drone Navigation in GPS Denied Environments

This project aims to improve existing algorithms for Self-Localisation and Mapping (SLAM) with a view to implementation on Edge AI enabled devices installed on real drones. The desired outcome is a method to intelligently fuse sensors like LiDAR, monocular depth estimation from RGB cameras, and inertial systems to provide robust obstacle avoidance capability in cluttered environments without reliable GPS data. The project will be conducted in both simulation and on real uncrewed aerial systems (UAS) with hardware-in-the loop experiments. Algorithms will be developed for Edge AI enabled devices to achieve UAS payloads that are lightweight and use minimal power whilst meeting flight safety requirements. The developed code will be embodied in UAS platforms developed and constructed.

UNSW DEFENCE TRAILBLAZER

Bayesian Inference for Passive Tracking

This project aims to identify fundamental solutions to address issues in capability. Ideal outcomes are two prototype algorithms, and a corpus of knowledge on two thorny problems with real implications for Australian capabilities. This work is expected to be useful in operational algorithms, and integration into operational work will be the next step.

Adelaide University ACACIA SYSTEMS

A Systems-based Approach to Validation of Safe Operation of Machine Learning Based Military Systems

This project will evaluate existing safety standards related to ADF products and develop an agreed baseline requirement set for machine learning (ML)/Autonomous system safety. The suitability of existing approaches to components of ML/autonomous system safety and methods of adapting to existing approaches will be assessed. The project will develop an integrated model for architecture of ML/Autonomous systems and methodology for establishing safety.

UNSW Advent Atum

Can Artificial Intelligence Improve Training of Unmanned Aerial Systems Operators?

The overarching aim of the project is to improve mission system training, resulting in mission aviators' ability to cope with complex operational situations. The study will inform the development and design of Adaptive Learning and AI strategies for simulation-based education for Uncrewed Aerial Systems (UAS) Operators.

UNSW CAE

Modelling of Silicon CMOS Multi-Qubit Systems

This project will generate a simulation capability that will reduce experimentation costs and allow predictive design capability for future quantum processors. This project will also accelerate timelines towards achieving full-scale fault-tolerant quantum computers by allowing rapid turn-around simulations using the multi-qubit system digital twin.

UNSW diraq

A Classical Simulation Framework for Noisy Quantum Devices

The research will improve the performance of Diraq's hardware, identifying optimal error mitigation strategies, laying the foundation for scalable, fault-tolerant quantum computing, and bringing us closer to technologies capable of achieving quantum advantage. This will directly support Defence by helping to close the gap between experimental quantum systems and practical Defence applications.

UNSW diraq

Sovereign Australian Ammonium Perchlorate Composite Propellant Production Optimisation and Scaling

The aim of the project is to understand the Solid Rocket Motor (SRM) needs of an Australian Guided Weapons and Explosive Ordnance (GWEO) Enterprise and deliver a conceptual design of a plant capable of meeting those needs. Key expected outcomes of this project will include: a report on forecast sovereign SRM needs; a prototype ammonium perchlorate composite propellant SRM capable of certification for use in the GWEO Enterprise; and a conceptual design of a SRM production plant capable of industrial scale production.

UNSW ENDEAVOUR AEROSPACE

Trajectory Tracking Control of Rocketry Systems for Improving Australian Sovereign Aerospace Capability

This project seeks to build national momentum in the development of missile technology through the development of a sovereign Australian missile system. A missiles guidance system dictates the flight path of the rocket and provides a reference attitude and trajectory to the autopilot. Research will focus on the design and integration of an autopilot control system, which will be designed to operate at various speeds and atmospheric conditions.

UNSW ENDEAVOUR AEROSPACE

Detecting and Understanding Influence in Online Social Networks

hese projects aim to develop a tool for integration into Fivecast's platform to detect and analyse online influence in social networks. The goal is to develop a commercialisable tool to be integrated into Fivecast's ONYX platform, for use by Fivecast's clients in the Australian Defence and national security communities. These projects will support that larger effort by producing high-quality labelled datasets, and exploring advanced mathematical models that could advance the capability of the final commercial tools.

Adelaide University FIVECAST

Investigation of Gas Phase Compression of USPL Laser Sources

High Powered Ultra Short Pulsed Lasers (USPL) are a growing technological area that has countless applications. Our mission is to create a sovereign USPL scientific and industrial capability. This research program is timely, practical, and addresses critical national needs. This ambitious leading-edge scientific program will create high value jobs to enrich the Australian defence industry and benefit Australian consumers in the long term.

Adelaide University HB11 ENERGY

Investigation of Amplifier Stages for Gas Phase Compression of USPL Laser Sources

The project aims to investigate and characterise a new approach for pulse compression, which is a new and novel method. A potential pulse compression in 2µm laser will enable cutting-edge experiments and new commercial opportunities.

Adelaide University HB11 ENERGY

Investigation of Electronic Components for Gas Phase Compression of USPL Laser Sources

The USPL lasers at 2 µm regime are rapidly evolving and playing critical role in areas like precision manufacturing, quantum, health, micro-machining, defence and in fundamental scientific research. As different techniques are investigated in attempt to energy scaling the USPL pulses and avoid laser damage threshold which remains the biggest challenge. To avoid the laser damage threshold and further increase the laser intensity, this project will investigate the use Volume Brag Grating (VBGs) for pulse compression. As the USPL laser sources in the 2µm domain are rare. The energy scaling of USPL sources will further enable new frontiers in science and offer technological advancement for industry and defence.

Adelaide University | HB11 ENERGY

Satellite Precision Attitude Control and Confluence-avoiding Trajectory Optimisation

The project will be developed around the following objectives:
1. To build a physics-based simulation of a satellite model that incorporates mechanical and electrical constraints and limitations in the actuation and sensing hardware, including disturbances and construction imperfections
2. To use sensor fusion and advanced estimation theory to improve the real-time understanding of the satellite state variables
3. To use the outcomes of objectives 1 and 2 to develop robust and control system algorithms for (a) high performance attitude control, and (b) trajectory planning which can minimise energy costs
4. To evaluate and optimise the dynamics and control algorithms with a series of benchmarks, which may include further simulation models, physical satellite analogues, and/or in situ satellite input/output data.

Adelaide University | INOVOR TECHNOLOGIES

Experimental Free Space Quantum Communications

Quantum communication is a translational technology that will make an impact on society before many other quantum technology offerings. The first commercial offerings of ultra-secure communication based on a Quantum Key Distribution (QKD) via attenuated multi-photon laser pulses are already on the market. Different from such offerings, an ongoing project at UNSW is the development of a free-space-optical QKD system based on the use of single-photon technology. This will lead to a compact quantum communication system that could then be potentially deployed onboard a low Earth orbit satellite in the future. Our overall objective is to design and test the first stages of a satellite-based QKD system that will deliver higher security relative to existing quantum satellites already in space.

UNSW | NORTHROP GRUMMAN

Cerebrum: Multi-agent Reinforcement Learning for Multi-target Protection

This project will develop cutting-edge multi-agent reinforcement-learning models and evaluate these against strong heuristic baselines. Cerebrum will implement these models against swarms of different Uncrewed Aerial Systems (UAS), analysing complex swarm behaviours, identifying vulnerabilities, and generating optimal engagement strategies necessary to defeat large scale UAS attacks with high precision at scale, and at machine speed.

Adelaide University

PRAETORIAN AERONAUTICS
PROTECT • DEFEND • DETER

A Low SWaP Two-Photon Rubidium Optical Atomic Clock for Alternate GNSS

While there are several research labs globally developing high-performance clocks, few are planned for or capable of commercial release. QuantX Labs is an Australian company experienced in translating quantum timing solutions out of the lab and into commercial products. QuantX has identified a potential market in satellite-based deployments of its low-SWaP (Size, Weight and Power), patented and high-performance optical clocks. The rubidium clock offers a revolutionary leap in potential performance for next generation Global Navigation Satellite Systems (GNSS). These GNSSs (the most well known is GPS) currently support USD $2B/day of global productivity. This project aims to address some of the main challenges: the process of reducing complexity, reducing SWaP, and increasing the robustness of the rubidium clock whilst maintaining its performance

Adelaide University

QUANTX

Strategic AI & Optimisation for Massive-Scale Autonomous Swarm Defense

This project develops sovereign strategies for the coordination of massive-scale autonomous drone swarms, specifically targeting 100 vs. 100 engagement scenarios. By merging game theory with algorithmic optimisation, the research utilises mathematical decomposition to break down vast decision spaces into modular, manageable components. This approach significantly scales up pure machine learning solutions, enabling coordination at levels traditional multi-agent reinforcement learning cannot reliably handle. A key innovation involves utilising Large Language Models to design sophisticated, human-auditable control logic; this process successfully converts foreign generative technology into an Australian sovereign capability. Every strategy produced is auditable and transparent, ensuring policy integrity and strict human-in-the-loop oversight.
Funded by Saab Australia, this project delivers the mathematical precision and “intelligent orchestration” required to protect critical infrastructure against adversarial threats.

Adelaide University

SAAB

Autonomous Swarms for Detection of Underwater Objects Using Decentralised Decision Support Systems and Signal Detection Using Machine Learning

This project aims to investigate multi-agent strategies for swarms of maritime vehicles. It will investigate opportunities with the scope defined by the following: distributed array sonar-like sensing algorithms for sensing underwater objects and reducing noise exposure to the environment; optimal control strategies for locating units within the maritime environment to improve sensing performance; multi agent sensor fusion for enhanced autonomous marine navigation, situation awareness, decision making, communication and coordination.

Adelaide University SAAB

Designing Pico-Materials for Superconducting Quantum Devices

Current fabrication technologies used for superconducting materials are somewhat limited. Furthermore, the physics of superconducting materials is dominated by a myriad of non-linear effects. In this project, a new generation of high-performing materials operating at higher temperatures will be developed. The objective is to achieve improved performance of quantum devices based on superconducting materials.

Adelaide University Silanna Group

Investigation of Future Wide Bandgap Semiconductor Materials for Integrated Circuit Applications

Ultra-wide bandgap semiconductor materials are an emerging technology that promises the development of novel devices with significantly improved performance in terms of power handling capability and operating frequency. This project will investigate the potential of integrating several of these devices on a common substrate, similar to integrated circuits.

Adelaide University Silanna Group

Trailblazer Electronic-Warfare Support System (TESS)

Development of RF Sensors and Novel Machine Learning Sense-making Algorithms for Cognitive EW

This project uses applied machine learning (ML) and advanced RF sensor hardware to detect, characterise, and identify radar signal behaviour in complex, contested, and congested EW environments. The modular architecture enables rapid updates to the processing algorithms, while adaptive AI/ML models provide a pathway to cognitive EW for spectrum operations and enhanced threat awareness. The system can rapidly identify and triage signals from central processing bulk datasets or directly on small platforms at the sensor edge, reducing the load on traditional manual analytic processes. The project also strengthens university partnerships with Defence to build national capability and expertise in AI and ML for EW applications.

Adelaide University SRC Aus

Fluorescence Analysis of Heavy Minerals for Terrestrial and Space Resource Utilisation

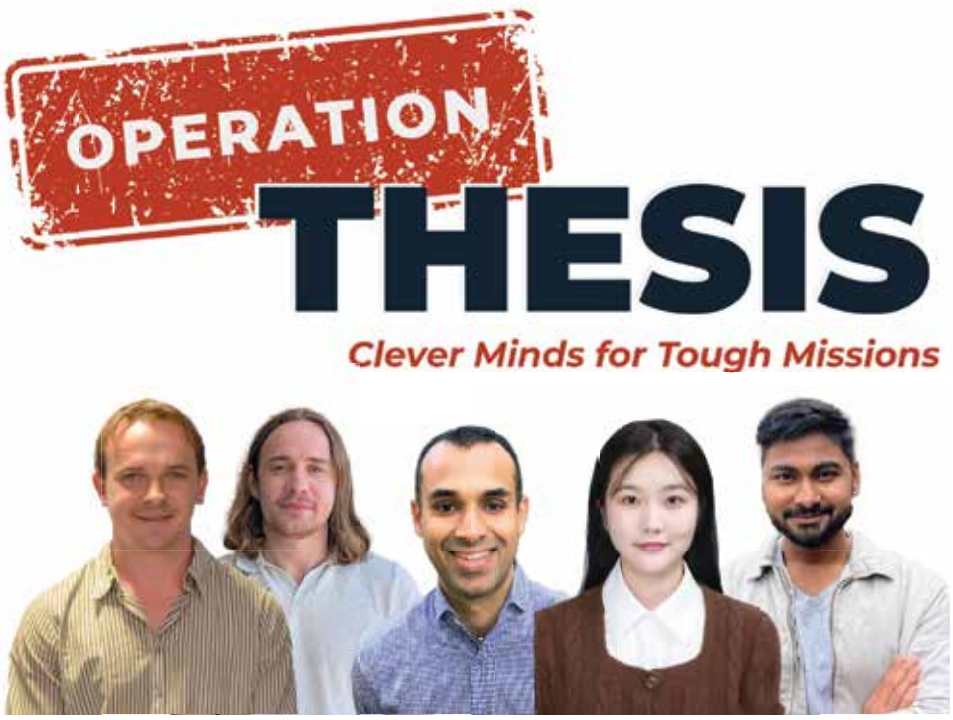
The project will utilise the existing Prescott Environmental Luminescence Laboratory (PELL) 'Novel Fluorescence discovery facility' to comprehensively characterise fluorescence from selected critical minerals, especially heavy minerals and rare earth elements. PELL research has detected usable novel fluorescence signatures from key heavy minerals, and many more are expected to be discovered.

Adelaide University TERAGLO

Autonomous Data-Driven Modelling for Advanced Satellite Constellation Management

The project will focus on pioneering research into automating the creation of data-driven digital twins (D3Ts) for space assets, emphasising the entire digital twinning process – from pre-processing to model training and validation. This research aims to streamline model selection and parameterisation within Zendir's Data-Driven Intelligent Modelling Engine (DIME) framework. The project will integrate novel methodologies into the existing digital twinning infrastructure using DIME's AWS cloud infrastructure. The expected outcomes include an algorithm to create an advanced prototype, a method to assess the feasibility of autonomous modelling, and a comprehensive validation of the automated process. This project will significantly enhance predictive analytics and remote health monitoring of space assets.

Adelaide University Zendir



L-R: Lachlan Pointon, Joshua Rusby, Ashwin Subramaniam, Qianchu (Sissi) Li and Aman Gupta will be presenting their projects at Operation Thesis

Operation Thesis is a 60-minute online spotlight event showcasing the next generation of defence innovation. Selected PhD and Masters graduates present their higher degree research projects, developed in partnership with industry, demonstrating how academic research is translated into practical solutions that enhance Australia's sovereign capability and address real-world defence challenges. As part of the DTECH26 program, Operation Thesis highlights the depth of university talent and the specialist knowledge being harnessed through industry collaboration, offering a unique opportunity to see academic innovation applied to strengthen national resilience and drive technological advancement.

Internships and Site Visits

STUDENT XCONNECT

The Student Placement & Projects program enables Defence Trailblazer industry partners and the broader defence sector, to host undergraduate and postgraduate student interns undertaking hands-on, industry-led projects.

This initiative gives Australian defence businesses early access to high-calibre students in their penultimate or final year, helping organisations identify and cultivate future talent pipelines.

Since 2024, 77 industry internships have been completed, with outcomes to date showing that 42 percent of participating students have received offers of industry employment, fulfilling workforce objectives to increase workforce capability.

Across 2024 and 2025, 56 students from Adelaide University and UNSW participated in industry site visits to Inovor Technologies, Silentium Defence and Supashock in Adelaide as well as Hullbot and Space Machines Company in Sydney.

Each visit was strongly supported by industry staff, who shared practical insights, demonstrated emerging technologies and highlighted the importance of defence industry work in building sovereign capability and its relevance to student academic pathways.

ADVANCED ALLOY HOLDINGS · AICRAFT · SPACE CINGULAN · CLEANSUBSEA · De Stefano & Co DEFENCE AND SECURITY EXPERTS · DEWC SERVICES · diraq · DTEX · ENDEAVOUR AEROSPACE · Halcyon Technologies · hullbot · HYPERSONIX LAUNCH SYSTEMS · INOVOR TECHNOLOGIES · INSIGHT VIA ARTIFICIAL INTELLIGENCE · ipau. · M&C SAATCHI WORLD SERVICES · PRAETORIAN AERONAUTICS · priori analytica · Quickstep · REACH ROBOTICS · ROTOR LAB · SABER ASTRONAUTICS · SECURE BITS · SILENTIUM DEFENCE · Space Machines Company · SRC Aus · SUPASHOCK ADVANCED TECHNOLOGIES

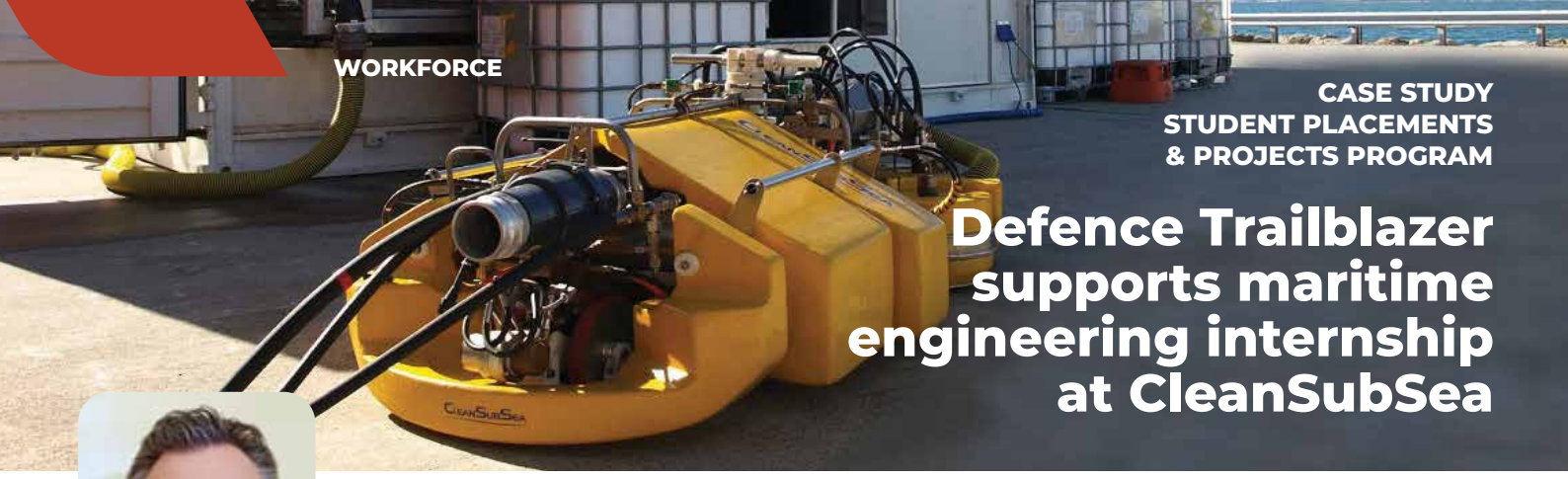
TESTIMONIAL

SILENTIUM DEFENCE · Adelaide University

"My internship was an opportunity to learn the importance of effective communication in multi-disciplinary teams to achieve project outcomes. I now more clearly understand how team members' specialised skills complement each other.

I also learnt the importance of becoming proficient in a specific set of skills, rather than trying to master everything."

— Edward Praschifka
Bachelor of Mathematical and Computer Sciences, Adelaide University



CASE STUDY
STUDENT PLACEMENTS
& PROJECTS PROGRAM

Defence Trailblazer supports maritime engineering internship at CleanSubSea

At Defence Trailblazer, the students we connect with industry partners are making a long-term impact in the workforce. Eugene Lamnek is one of dozens of students who've taken part in our Workforce Connect initiatives.

An experienced software developer, Eugene is currently completing a Master of Maritime Engineering at Adelaide University, with a particular interest in control software for unmanned underwater vehicles.

In 2025, Eugene completed a three-month internship at CleanSubSea. The Western Australian company is the developer of an underwater hull cleaning robot, Envirocart™.

"The project involved developing tools for weight and buoyancy management of the Envirocart hull cleaner," said Eugene. This complex robot has over 1500 parts and requires regular updates for optimum performance.

Eugene developed automated processes to determine the weight and buoyancy of each part, with a simple user interface to make analysis and updates straightforward.

"There is no off-the-shelf software that provides an adequate solution, so I developed bespoke software tools to integrate with commercial software to provide a solution," said Eugene.

"This internship allowed me to work directly on a maritime engineering project that combined my existing skills in software development, while also enhancing my skills in the maritime domain."

Senior mechanical engineer Alexander Trushin, project technical lead and Eugene's supervisor at CleanSubSea, has been impressed with Eugene's work.

"Eugene successfully processed a large volume of raw engineering data and developed a valuable calculation tool that we will now use within our engineering department," said Alex.

"I'd like to express my sincere appreciation for the quality of work and professionalism that Eugene has demonstrated, and I am thankful for the opportunity to engage with the Defence Trailblazer program."

CASE STUDY | STUDENT PLACEMENTS & PROJECTS PROGRAM

'Roadside Assistance in Space' becomes a reality with Defence Trailblazer interns

Internship opportunities at Space Machines Company have enabled students to work closely with the company's engineering team to help make 'Roadside Assistance in Space' a reality. This involved participation in the design and building of SMC's Orbital Servicing Vehicles (OSVs).

Angus Macdonald, a current Defence Trailblazer intern at Space Machines Company in 2025 said, "SMC has been very supportive throughout my industrial training experience and I am surrounded by like-minded people who are passionate in their field. I have not only gained valuable experience working in a corporate environment, but plenty of hands-on experience amongst the projects I have been assigned. After speaking to fellow students who have undertaken internships at much larger companies, I feel that I have been lucky to receive the chance to gain practical experience that has accelerated my skills as an engineer."

Angus Macdonald is currently completing his Bachelor of Electrical Engineering and Computer Science at UNSW

L-R: Matthew Fowler, Allan Dundas, DEWC Services; Dr Sanjay Mazumdar, Defence Trailblazer; Hard Patel, DEWC Services.

CASE STUDY | STUDENT PLACEMENTS & PROJECTS PROGRAM

Growing the Defence workforce pipeline through real-world learning opportunities

DEWC Services is contributing to the development of Australia's future Defence workforce through its participation in Defence Trailblazer's Student Placement and Projects Program

The program provides students with opportunities to gain real industry experience through tailored work projects and internships, supporting skill development and work integrated learning across Defence focused disciplines.

Through this initiative, DEWC is hosting emerging engineers and technologists and providing them with exposure to real Defence problems from the outset.

Two recent interns, Adelaide University computer science and engineering graduates Hard Patel and Matthew Fowler, have now transitioned from student placements to full time roles at DEWC, where they are delivering Defence-aligned work.

As part of their placements, both contributed to technically complex projects and participated in AI-focused innovation challenges, helping accelerate their transition into Defence capable professionals.

Hard is now contributing to the Adelaide University and DEWC research collaboration focused on developing AI-enabled decision support systems for Defence.

"The placement gave me the opportunity to apply my university learning to real Defence challenges," Hard said.

"Being able to contribute to a project that will support decision making in complex environments has been incredibly rewarding."

Matthew also broadened his practical experience during his placement, including taking part in the Microsoft AI Hackathon as part of Team Blueprint, a joint DEWC and SOCO team that was awarded first place. He is now working full time on a Defence project.

"Through the internship, I was able to apply what I've learned in a way that genuinely supports Defence," Matthew said.

"Having experienced mentors to guide me through real Defence challenges helped me build the skills I need so I can contribute to meaningful Defence work."

The workforce programs align with Defence Trailblazer's mission to strengthen Australia's Defence capability by equipping the next generation of innovators with the specialised knowledge and skills required in the sector.

Defence Trailblazer Executive Director Dr Sanjay Mazumdar said the program plays an important role in building Australia's Defence workforce pipeline.

"Programs like this ensure we are developing the future workforce required to deliver sovereign capability. When students gain hands on experience with industry partners, they build the practical skills and confidence needed to contribute to Defence from day one," Dr Mazumdar said.

CASE STUDY
STUDENT PLACEMENTS
& PROJECTS PROGRAM

Industry-led SRC Aus internship to develop electronic warfare technology

Through the Defence Trailblazer's Student Placements & Projects Program, SRC Aus hosted an internship to support critical research into an EW support system.


Stacey Heng

The Defence Trailblazer Electronic Warfare Support System (TESS) project is preparing systems for high-volume testing of machine learning algorithms for signal detection, clustering, deinterleaving, and classification.

Stacey Heng, a University of Adelaide (UoA) Space Science and Astrophysics graduate undertaking further studies in Mechatronics and Robotics Engineering, was chosen for the internship based on her strong abilities demonstrated in her Honours degree and her interest in signal processing.

During the internship with SRC Aus, Stacey worked on engineering development, test, and evaluation of systems in support of the TESS project. The goal was to prepare the system for high-volume testing of machine learning algorithms for signal detection, clustering, deinterleaving, and classification.

The EW research lead at SRC Aus, Dr. Vichet Duk, noted Stacey's perseverance, confidence, and willingness to seek clarification when faced with technical challenges.

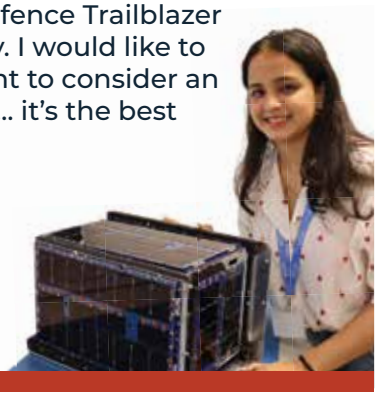
"Stacey's internship exemplifies the spirit of innovation and collaboration that drives progress in the engineering field. We are confident her experiences will inspire her to continue the pursuit of excellence in delivering results in future for Defence"
— Dr. Vichet Duk, SRC Aus research lead.

TESTIMONIAL

"My internship experience at Inovor Technologies was an incredible learning experience for me. I gained real-world insights, explored cutting-edge advancements in the space sector, and even had the opportunity to visit different space companies. One of the highlights was pitching an idea to the Chief Operating Officer and I was nervous, but it was an exciting and rewarding experience, especially since they liked it!

Beyond the technical and industry exposure, I truly enjoyed working alongside the amazing staff and fellow interns. The experience has not only expanded my knowledge but also contributed significantly to my personal growth. I honestly can't stop talking about how worthwhile this internship has been!

I really appreciated the constant coordination and support provided by Defence Trailblazer throughout this journey. I would like to encourage every student to consider an internship opportunity ... it's the best experience ever!"



— Relcy Onil Ruzario,
Masters of Data Science,
Adelaide University

TESTIMONIAL

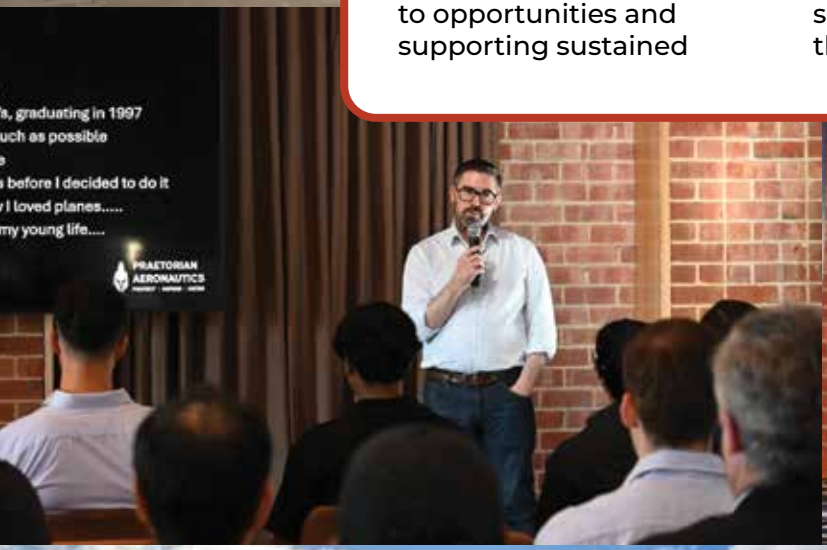
"My Defence Trailblazer internship has been a genuinely rewarding and transformative experience. As a student, working within engineering systems in the defence sector gave me real-world exposure far beyond the classroom and deepened my understanding of how complex technical projects are delivered in operational environments.

My line managers were consistently supportive, patient and generous with their knowledge. I'm incredibly grateful for this opportunity."

— Lavanya Saini
Bachelor of Information Technology/Cybersecurity,
Adelaide University

STUDENTXCONNECT

To further strengthen pathways into the defence sector and deepen university–industry collaboration, Defence Trailblazer coordinates StudentXConnect networking events that build an ecosystem, improving student access to opportunities and supporting sustained collaboration. These events were attended by University staff, students and industry representatives, providing a forum to build professional connections, discuss the current defence landscape and identify emerging capability needs and future skills demand across the sector.



Staff Mobility Program

The Staff Mobility Program connects subject matter experts and leading academics with industry to accelerate defence capability development and foster long-term university–industry partnerships.

Under the program, university staff can be placed with industry partners, and industry staff can work within universities, promoting fresh perspectives and collaborative problem-solving. 13 academics have been embedded in industry, generating ongoing dialogue and repeat collaboration opportunities.

CASE STUDY

Skykraft

Associate Professor Hemanshu Pota, from UNSW Canberra at the Australian Defence Force Academy's School of Engineering and Information Technology, is part of the Defence Trailblazer Staff Mobility Program, working with Canberra-based SME Skykraft, who are building a large constellation of satellites to operate in low Earth orbit, in order to provide global air traffic management services from space.

Speaking about the experience, Associate Professor Hemanshu Pota said, "Taking my practice back into teaching at UNSW Canberra at ADFA, you can imagine all the students will sit up and take notice of my learnings in controlling a satellite in space. And at Skykraft, I am collaborating with some of the younger engineers, to help them think like researchers including how to evaluate learnings and look at results critically, to nudging them in the right direction and providing moral support."

UNSW

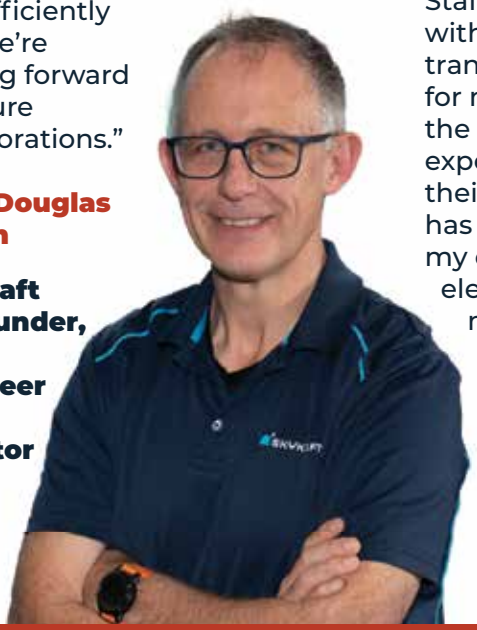
TESTIMONIAL

SKYKRAFT

"Having Associate Professor Hemanshu Pota work in our Skykraft labs has enabled the quick development of technology to control the pointing of our spacecraft – capability essential to the delivery of our space-based Air Traffic Management Services. The Defence Trailblazer understands the commercial drivers of SMEs when it comes to the timelines associated with critical technology development, project approvals, kick-off and delivery. They broke the mould here; we got our outcomes quickly and efficiently and we're looking forward to future collaborations."

— Dr Douglas Griffin

Skykraft Co-founder, Chief Engineer and Director



CASE STUDY

SRC Aus

Providing senior level expertise and support to the Defence Trailblazer Electronic Warfare Support System (TESS) R&D project, SRC Aus is participating in Defence Trailblazer's Staff Mobility Program. The program has enabled Dr. Raja Abdullah, a Research Fellow from the School of Electrical and Mechanical Engineering at Adelaide University, to take part in a university secondment which embedded him into SRC Aus for 22 months.

Adelaide University

"Participating in the Staff Mobility Program with SRC Aus has been a transformative experience for me. Working alongside the SRC Aus experts and experienced engineers in their cutting-edge facilities has significantly enhanced my expertise in developing electronic systems that meet rigorous military standards."

— Dr Raja Abdullah McKenzie

Researcher, Adelaide University

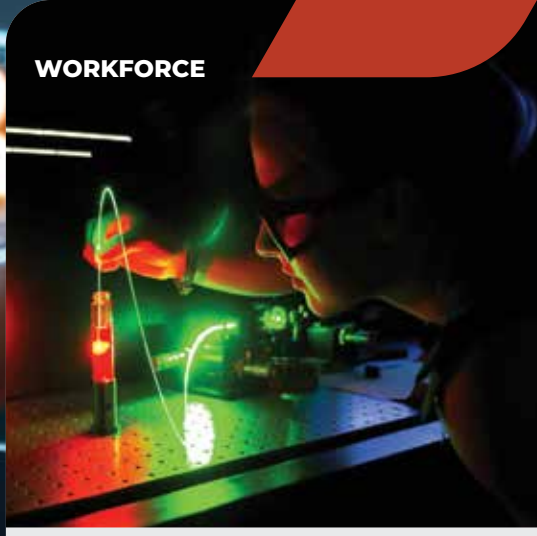


Image: Erik Schartner, IPAS

CASE STUDY

HB11 Energy

The Defence Trailblazer Staff Mobility enabled Professor Thomas Kuehl to relocate to Australia and work with HB11 Energy on their Defence Trailblazer collaborative research project with Adelaide University.

Adelaide University

TESTIMONIAL

SRC Aus

"Dr Raja Abdullah has been a tremendously valuable addition to our research and development team. His experience in passive radar technology, advanced direction-finding algorithms, and application of machine learning techniques to digital signals have resulted in significant advances in our design and prototype development. In particular, his work with Dr Vichet Duk in advancing the approach and opening the door to wide applications of our system to future problems in ADF EW support have been of great benefit to all of us at SRC Aus. Lastly, he also generously coached and tutored Electrical Engineering candidates, in coordination with our principal research lead, Dr Brian Ng at Adelaide University. "

— Richard Button

Technical Director - Adelaide, SRC Aus

TESTIMONIAL

HB11 ENERGY

"We are very pleased to welcome Prof Thomas Kuehl to Australia, one of the world's best minds in the field of high-power lasers. Thomas has joined us from JoGu University in Germany and has built one of the highest power lasers in the world – the PHELIX Petawatt. Thomas is not just an asset to HB11 Energy team and our mission for fusion energy, he is an asset to Australian research at large and will be critical for the establishment of an Australian National Laser Facility. The Defence Trailblazer Staff Mobility Program was critical in attracting Thomas to Australia."

— Dr Warren McKenzie

Managing Director, HB11 Energy

Defence Trailblazer Photonics Technologist Training Course

Part-funded by Defence Trailblazer, the IPAS Photonics Technologist course is a specialised short-form training initiative delivered through the Institute for Photonics and Advanced Sensing in collaboration with Photonics Industries Australia Ltd that equips participants with foundational and applied skills in photonics — the science and technology of light-based systems. The course focuses on core photonics principles and technologies used in advanced sensing, measurement, optical fibres, lasers and related applications that are critical to high-tech sectors including defence, telecommunications, manufacturing and quantum systems. It is designed for early-career engineers, technologists and practitioners aiming to build practical competence with photonics tools, techniques and industry-relevant problem-solving, bridging theoretical knowledge and workplace applicability in a rapidly growing technology domain.

IPAS Institute for Photonics and Advanced Sensing

INDUSTRY UPSKILLING

Combat Systems Engineering (CSE) Micro-credentials

Building sovereign and resilient combat systems engineering capability at speed

Australia's defence industry faces a shortage of applied combat systems engineering expertise and structured pathways for developing integration-ready capability.

The Combat Systems Engineering (CSE) Micro-credentials address this gap through courses co-designed and co-delivered with the University of New South Wales (UNSW) and Adelaide University , together with our industry partners

Working closely with industry partners like Lockheed Martin Australia, the courses provide industry-validated, applied learning aligned to real-world defence delivery environments.

The six-unit suite covers systems engineering, radar systems, command and control, C4ISREW, mission engineering, military effectors and mission engineering.

Designed for graduate engineers or mid-career defence engineering professionals, the program enables rapid capability development. Each credential can be deployed individually to address targeted capability gaps or combined as a full suite to scale workforce capability across teams and programs.

The micro-credentials are credit-bearing and built to formally articulate into existing defence and engineering qualifications. The units are delivered as a hybrid model including on-line and face to face learning, providing flexibility for workers while still opening opportunities for peer learning within the class.

To date, more than 190 learners from across Australia's defence industry have successfully completed the CSE micro-credentials and opportunities exist for further industry collaboration.

> *"The Defence Trailblazer Combat System Engineering micro-credentials are an excellent selection of topics for any engineer working in the defence industry who does not have a background in defence. The combination of hard technical knowledge through subjects like Military Effectors is balanced by learning the higher-level principles of how military forces carry out their operations using Command and Control.*
>
> **— Travis Hunt, Fundamentals of Mission Engineering Course Instructor, UNSW**

> *"The face-to-face workshops were fantastic! The group projects allowed us to put new ideas into practice straight away, providing immediate reinforcement of our learning. I particularly enjoyed working as a team on a project directly linked to the concepts we'd just studied.*
>
> **— a participant**

TESTIMONIAL

SWORDFISH COMPUTING

"As a company supporting Defence research, we are recognised for bringing expert domain knowledge into our engineering work. [The Command and Control microcredential] further strengthens that capability by deepening our understanding of operational C2 systems and their application in real-world Defence contexts. The knowledge our engineers gained enhances the relevance and impact of the systems they help design and develop. We highly recommend this training to any organisation working in the Defence sector, particularly those involved with Command and Control concepts and systems."

— Themie Gouthas
CTO, Swordfish Computing

Cyber Security Voucher Program

Defence Trailblazer established a voucher program allowing industry partners to access cyber security education and training as well as other capability uplift activities.

Developed in consultation with industry, the program addresses the industry preference for flexibility that enables cyber uplift unique to each businesses' requirements, helping businesses scale up their operations and introduce new initiatives to enable a more robust cyber security environment.

Launched in May 2024, 26 Australian SMEs have now received support through vouchers of up to $50,000 each, resulting in the award of over $1.1 million in total funding. The vouchers have already made a significant impact. SMEs have used the vouchers to undertake activities such as cyber maturity reviews, risk assessments and roadmaps, purchase security hardware and software and achieve DISP and ISO27001 accreditations.

> *"[Our company] is very grateful for the Cyber Security Voucher funds to assist with an effective infosec uplift, to protect [our] IP and resulting defence capability.*
>
> **— CSVP participant**

SUPPORTING PARTNERS

APEX SENTINEL · Australian Cyber Collaboration Centre · BLUERYDGE · DTEX · Providence · Adelaide University · UNSW Institute for Cyber Security · VIDEN

DINAMIC Program Overview

DEFENCE, INDUSTRY & ACADEMIA MILITARY INNOVATION & COMMERCIALISATION

The Defence Trailblazer has successfully delivered the DINAMIC (Defence, Industry, Academia, Military, Innovation & Commercialisation) innovation program since 2023. The program has supported more than 350 innovators to understand the defence innovation ecosystem and enabled 87 ventures to accelerate their defence technology.

Defence validation is central to our selection process, incorporating user feedback, demonstrations, and trials. Defence stakeholders actively participate in later-stage selection.

Our curated cohorts - comprising academia, industry, and Defence (serving personnel and veterans) - foster long-term collaboration across sectors.

Program Pillars

1. Defence Readiness – Preparing innovators for entry into the Defence supply chain.
2. Commercial Readiness – Strengthening business fundamentals for sustainability.
3. Technical Readiness – Advancing technologies through TRL stages and Defence technical requirements.
4. Investment Readiness – Supporting investment preparedness and connecting with trusted capital partners.

Programs are delivered in hybrid formats and tailored to individual business needs, supported by experienced experts and mentors.

"The cohort's diversity fostered collaboration and lateral thinking. It was energising to work alongside complementary innovators."

— Defence Tech Innovator

"DTB has provided DefenSight with the structure, contacts, and mentorship to progress from laboratory proof-of-concept research-based workflows to scalable sovereign CBRN-relevant capability."

— Dr Sonja Frölich, Adelaide University researcher and Founder & Chief Scientist, DefenSight

COMMERCIALISATION PATHWAYS FOR DEFENCE INFORMATION SESSIONS

TRL 0-1

The Commercialisation Pathways for Defence Information Session is a two 2-hour introductory webinar targeting researchers and students at universities, and innovators in defence and other industries.

BOOTCAMPS

TRL 1-2

2-day workshops designed to help innovators understand the Defence market, refine value propositions, and plan early-stage commercialisation.

ENTREPRENEURIAL FOUNDATIONS FOR DEFENCE

TRL 3-4

A 10-week intensive program featuring:

- 15 webinars on readiness pillars
- Two 3-day in-person intensives with a curated cohort of academia, industry and defence innovators
- Networking opportunities within the cohort and with experts relevant to supporting businesses looking to operate in the defence market
- Showcase event for end-users, customers, and investors

DINAMIC INCUBATION

TRL 4

A bespoke 10-week hybrid program focused on scaling and technical progression, with tailored expert support.

Program benefits:

- Defence Market Engagement
- Hands-on Learning Activities
- Value Proposition Pitching
- Expert Feedback
- Bespoke mentoring support
- Curated Cohorts
- Advanced Technical Support

D10X ACCELERATOR

TRL 4

Defence Trailblazer has partnered with UNSW Founders to deliver the PreX and Defence 10x Accelerator programs to help early-stage startups to level up their ideas and products, and build the habits to be a successful founding team.
The Defence 10x Accelerator program provides accelerator support exclusively servicing defence-focused startups.
An additional (confidential) partnership with a leading venture capital firm within the defence space brings valuable financial support and provides critical industry insights, helping to propel our startups towards success in the vital field of defence innovation.

HIGH GROWTH INCUBATION

TRL 5

High Growth Incubation is a bespoke support program to position a small group of high-potential founders to attract the investment and scale their venture for market expansion.
A grant is made available to each participant to support business growth.

DINAMIC Venture Profiles

Advanced Alloy Holdings' flagship Bright Brass™ is an outstanding new material with customers within defence for use in next-generation sovereign ammunition. This dual use material also has application within the plumbing industry for lead-free tapware and fittings, and in the engineering/transport sectors for self-lubricating bearings and gears.
Brass for High-Performance Ammunition Casings: AAH Bright Brass™ cased munitions are lighter weight and being produced for trial by the Australian Defense Force in partnership with Thales Australia. Early tests have shown increased range and energy at target when compared with cartridge brass-cased bullets.

advancedalloyholdings.com

ACDC is a private research and development company, born through the innovative mind of Thomas Baldacchino. Thomas combined his materials science expertise and leveraged it utilising AI to create a lightweight semi solid state nickel iron battery with a cycle life exceeding that of lithium ion. Through their collaboration with Alex Cross and Starknex, ACDC leverages their extensive experience and cybersecurity proficiency to foster innovative ideas and establish a high level of security. Alex utilises his experience to mentor and drive ACDC to success, whilst our cybersecurity team works tirelessly to protect our systems, implementing robust security measures and ensuring we are protected from all threats.

acdcorp.com.au

Advent Atum's HORAS TDE is a scalable, autonomous fire control system offering AEGIS-class capabilities for any weapons platform, including Remote Weapon Stations (RWS), Anti-Aircraft Guns, Missile systems, and Indirect Fire platforms. It autonomously detects, tracks passively ranges, and engages threats in real-time, combining AI with precision targeting and cooperative engagement capability.
HORAS TDE fuses data from multiple sensors, delivering superior situational awareness and fast response to threats. Its modular design ensures integration with various platforms with current deployment converting RWS and AA guns into effective counter-drone systems. HORAS TDE empowers forces with a multi-domain solution to dominate the modern battlefield.

adventatum.com

Apogee Shield is developing an electronic jamming cancellation device to help drone operators maintain communications and navigation in an EMS degraded environment with a chip-sized device that uses photonics to detect and filter threat signals.

apogeeshield.com

Aquila enables drones to fly indefinitely using safe, efficient optical power beaming technology. By replacing short-lived batteries with continuous, long-range optical energy, we solve the critical endurance bottleneck for defence, border security, and industrial drone operations.
Today's Lightway Sentry product is just the beginning. Our broader vision is to build the world's first optical energy network, wirelessly distributing power at scale to transform global infrastructure, provide universal energy access, and secure critical services anywhere on the planet.

aquila.earth

With over 70 years of experience in marine hardware and engineering, Ausco is now expanding into advanced maritime systems. Their latest innovation, GannetDive LRX, is a mobile, modular launch and recovery solution designed to support the safe and efficient deployment of autonomous and remotely operated platforms. Scalable and adaptable, this technology has applications across defence and commercial sectors, enabling reliable operations in challenging marine environments.

auscogroup.com.au

Australian Droid + Robot (ADR) deliver world leading field hard & field proven dual-use sovereign robotics that are high appeal to the heavy industries such as mining, defence, & security.
The economics of many vital common tasks no longer stack up, often a solution simply can't be found & they relegated to the 'wish list' for many big companies. ADR'S proven robotics with advanced software for control, data harvesting, mission modes, & insight generation directly enable massive step changes in the Safety – Productivity – Efficiency of a range of current heavy industries jobs.
ADR is currently engaged with the Australian Defence Force exploring the opportunities and applications of remote collection.

australiandroid.com.au

The Guided Weapons and Explosive Ordnance Plan calls for the domestic manufacture of missiles. These missiles use solid rocket motors for propulsion. 70% by mass of the propellant in these motors is a chemical called ammonium perchlorate (AP). We have invented a scalable, dispersible and novel waste-free, high yielding manufacturing process for this key material. AP is not currently manufactured in country and importation is extremely vulnerable to supply chain disruption, especially during conflict.

n.kanizaj@unsw.edu.au

Aurora Materials is a pioneering company at the forefront of advanced materials science, dedicated to enhancing and securing supply chains through innovative solutions.
Aurora Materials specializes in the development of modular emissive materials with tunable fluorescence properties. Our materials can be tailor made to your specification, offering a large window of excitation and emission wavelengths, including the visible, UV and near-infrared (NIR) spectrum. This technology provides unparalleled security and traceability, designed to meet the rigorous demands of modern defence and security applications. By leveraging our cutting-edge materials, we aim to bolster the Australian defence industrial base with a sovereign capability that ensures operational readiness and strategic resilience.
At Aurora Materials, we are committed to driving innovation and excellence, contributing to a safer and more efficient supply ecosystem.

auroramaterials.com.au

Bastogne Systems has developed FOG SAFE, an ultrarapid fog concealment technology designed to counter the escalating threat of unmanned systems, precision weapons, and advanced sensor platforms across land, maritime, and civilian domains.

operations@bastognesystems.com

An AI Agent for every mission. Breaker's Agent is an autonomy software stack that enables a single operator to manage multiple autonomous systems using two-way natural language and the radios they already carry. The system makes intelligent decisions by analyzing mission context and coordinates effectively with other robotic assets to form a cohesive team. Breaker's Agent is currently deployed onto platforms for customer delivery. Breaker works closely with international Defence groups to deliver Breaker's Agent onto ISR platforms. Breaker is ready to demonstrate capability to operators and integrators.

breakerindustries.com

Carrot Aero Innovations is an Australian technology company on a mission to deliver asymmetric advantages through advanced uncrewed aviation systems. We develop novel, cost-effective solutions that give Australian and partner forces a decisive edge, ensuring they can overmatch future threats. Our flagship product, the Lapwing Tactical Missile System, is a cost-effective, container-launched solution that delivers extended range and precision fires. By leveraging modern, mass-produced electronics and a novel computer vision-based navigation system, we are placing leading-edge, asymmetric capabilities in the hands of the warfighter, ensuring they can meet and overmatch emerging threats. Lapwing is cheaper, faster, goes further and hits harder.

carrotaero.com

CleanSubsea is a Western Australian based company that owns all licenses and patents associated with a revolutionary new fully enclosed complete capture, containment and filtration In-Water Hull Cleaning technology called the Envirocart™ System.
An Innovative Blade Based Underwater Hull Cleaning System.
Our mission is to re-introduce environmentally secure and responsible In-Water Hull Cleaning to the world's ports. Our commitment is to contribute to global efforts to combat climate change and protect Marine Biodiversity.
We share your passion for the world's ocean, new research, technologies and award-winning enviro-friendly solutions.

cleansubsea.com.au

Crest Robotics is de-risking naval asset maintenance, to help labourers and managers deliver asset care programs with enhanced safety and productivity, increasing longevity, cost-effectiveness, and preparedness of the fleet with dynamic tool-wielding robots.

crestrobotics.co

DefenSight: an AI-guided microscopy for biosecurity and CBRN preparedness
DefenSight is an emerging AI-guided, microscopy-integrated platform designed to strengthen national biosecurity and defence readiness by providing high-resolution insights into potential biological threats.
Built for compatibility with modern microscopy systems, DefenSight combines machine learning, digital pathology principles, and automated analytics to support the early-stage pathogen screening across research and applied contexts.

defensight.com.au

Dragonfly Thinking is developing techniques and AI-powered tools to help decision makers and analysts make better decisions in complex situations with the help of a structured analytics framework.

dragonflythinking.net

ecoJet strives to provide solutions tailored to each challenge. Our Research & Development program continues to innovate leading capabilities to solve a range of current and emerging problems. By employing an agile approach to solution development ecoJet is able to respond dynamically to emerging challenges, incorporating leading technology beyond Micro Turbine Engines (MTEs) to achieve a tailored solution.

ecojetengineering.com.au

Ecospectral builds AI backed products and services that give unprecedented understanding of the built space measuring occupant and building properties to provide deep understanding of typical behaviours, fast detection of abnormal behaviours (in occupants and structure) with realtime feeds and AI based analysis and detection. The knowledge gained using award winning BRIM sensors and systems provides critical data to building owners, occupants, emergency services and first responders in understanding how the space is used, tracking and catching abnormal behaviours and events, and analysing and supporting responders in real-time with valuable visual and data feeds.

ecospectral.com

Electro Base is a Western Australian renewable energy company with a secure, Australian-engineered Energy Management System. We provide grid-independent battery storage and e-mobility charging solutions powered by renewable energy.
Our Comprehensive Services Include:

- Energy Management Systems (EMS)
- Renewable Energy Storage and E-Mobility Charging
- Consulting and Operations

electrobase.au

EpiCentre.dev is developing decision support for cyber attack management to help decision makers in organisations and government understand the situation and identify and respond to possible cyber-attacks through transforming network data into a probabilistic map of status and intent.

epicentre.dev

Based in Perth, Western Australia, EXTAG has developed a software platform that helps asset intensive organisations ensure their assets are compliant, safe and ready to use.
Proven in the Mining and Oil & Gas sectors for the last 6 years, EXTAG's proprietary flexible platform enables rapid deployment and delivers customised value and outcomes for tactical, operational and strategic levels.

extag.com.au

Fortifyedge provides Zero Trust identity and access solutions for the tactical edge utilising TinyMLOps. Specialising in Machine learning and AI for OEMs. Currently focusing on cyber/physical security. Fortifyedge's mission is to solve the most complicated problems. Using state of the art approaches like edge computing and machine learning even when disconnected. So you can make trusted decisions at the speed of relevance.
We solve the problem of 'Are you whom you say you are' seamlessly and continuously for highly mobile operators that can't be distracted by using smart cards, USB keys and passwords to access systems. Operators such as Public Safety professionals in PPE and warfighters in extreme conditions need strong authentication and access where traditional solutions are too cumbersome and put them at risk.

fortifyedge.com

Frontier Materials Technologies is leading the way through our core product KinetiShield. KinetiShield represents a breakthrough Sovereign Hydrogel Tamper Material. It is a unique blend of safe grade material with superior tampering characteristics.

KinetiShield is at the forefront of our R&I efforts with the aim to upscale production. At Murdoch University, we are committed to engineering a robust innovative sovereign product.

g.poinern@murdoch.edu.au

Ghost Fire Systems specialises in designing electronic battlefield simulators to optimise tactical training. Combining our 40 years of experience in the Australian Army as users & trainers and our expertise in electronics and engineering, we've created electronic battlefield simulator systems.

Our systems are plug and play, have no safety requirements, expend no by-products and have unlimited cycles, allowing operators to train any time, in any environment and run unlimited scenarios, to increase their lethality at the team level.

ghostfiresystems.com

GLIA Diagnostics is developing a point of care (POC) device, to help defence medical staff/operators define traumatic brain injury (TBI), within 20 minutes using a novel detection technology, incorporating proprietary blood based biomarkers.

gliadiagnostics.com

Halcyon Technologies is developing a maritime drone system with launch and recovery technology for the Navy, Army (amphibious forces), and the Australian Border Force. Our team, with extensive experience in large-scale autonomous systems, offers a low-cost, semi-attritable aerial surveillance solution integrated with other platforms via remote links, providing a significant capability edge and Warfighting advantage.

halcyontechnologies.com.au

hullbot

Hullbot is an innovative dual purpose defence and civilian subsurface capability, that offers a pragmatic solution for the cleaning of military vessels. This unmanned robotic cleaning system is engineered to automate hull maintenance, thereby reducing the need for manual labor and dangerous diving operations. Its implementation leads to increased efficiency in resource utilisation and maintenance processes.
Designed for military use, Hullbot provides a reliable, time-saving, and safety-enhancing tool, aligning with the operational demands and precision requirements of naval forces. This technology represents a significant step forward in optimizing vessel maintenance in various military contexts.

hullbot.com

IIK MATERIALS

IIK Materials is developing nanocomposite anechoic tiles for defense ships and submarines to reduce enemy detection at depths over 300m. Unlike rubber, these tiles withstand high pressure and are cheaper to manufacture, proving effective in laboratory tests.

unsw.edu.au/staff/imrana-kabir

InVision Tactical Group is an Australian defence technology company building next-generation ISR camera systems designed to defeat concealment and deception. Our MANTIS sensing capability reveals visual anomalies that conventional ISR can miss, assisting operators to detect synthetic camouflage and other man-made materials in complex environments. With Omnis AI as an onboard detection layer, the system highlights potential threats in real time across land, air, and sub-surface operations.

invisiontactical.com

JACKAL INDUSTRIES
Empowering Grey Matter – Enabled by Silicon

Jackal Industries have created the MIRAGE System. It's a low-cost, multi-role Electronic Warfare (EW) payload you can reconfigure in minutes. Whether you need to create a ghost decoy to deceive the enemy, jam their communication links, or gather intel, MIRAGE is capable of integrating with UAS, UGV, or manned systems already in use. Their practical training courses, are designed to help end users understand modern threats, own signatures across the spectrum, use modern masking techniques to stay hidden, and leverage deception to dominate the battlefield

jackal-industries.com

KINEM

KINEM Robotics is developing a low-cost Optionally Crewed Remote Placement Platform (OCRPP) to help ADF and allies operate in hostile environments. Integrating weapons handlers, machine vision, communications, and AI, this deployable platform performs defense, surveillance, and support tasks, enhancing tactical and operational capabilities in semi-autonomous warfare.

kinemrobotics.com

MULTIFORGE

Multiforge, an Australian company, designs and manufactures physical training aids to help emergency responders improve their limited tactical positioning training resources by producing customer tailored and specific, modular, scale training aids that are intuitive to use and increases training engagement, efficiency and effectiveness. Multiforge has developed physical training aids to help aviation emergency responders improve their limited tactical positioning training resources by producing specific, modular, training aids (built to scale) that are intuitive to use and increase training engagement, efficiency and effectiveness.

linkedin.com/company/multiforge

NanoCube

NanoCube is developing an advanced body armour designed to provide full-body ballistic protection while addressing common issues such as breathability, temperature control, comfort, and mobility. The technology features infrared signature reduction to reduce detectability and traceability using thermal imaging devices. The technology is designed

to protect personnel against potentially fatal or non-fatal injuries, and can also be used as a laminate layer on aircraft, vehicles, marine craft and deployed infrastructure to protect against damage in combat.

nanocube.com.au

NAUTIC Technologies is dedicated to developing cutting-edge safety devices for the maritime industry, with a focus on enhancing safety protocols for professional, recreational, and defence members.
Our innovative devices are designed to keep users safe operationally, offering peace of mind in various underwater environments.

nautictechnologies.com.au

Panop (previously Canberra Dynamics) is an Australian defence technology firm specialising in advanced electromagnetic systems for defence and national security. We design and deliver technologies that give military forces the ability to detect, interpret, and control activity in the electromagnetic spectrum—enabling faster, more informed decisions in complex operational environments.
Our core expertise spans electronic warfare, radio-frequency and microwave engineering, signal processing, and autonomous systems.
We develop tools that provide real-time situational awareness of invisible signals—such as radar, communications, and electronic emissions—and empower operators to act with precision and control.

panop.com

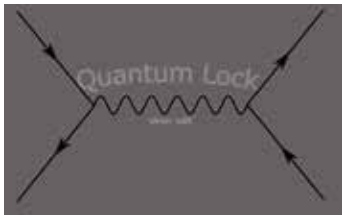
Praetorian Aeronautics is an Australian defence company focused on developing advanced unmanned aircraft systems (UAS) and counter-UAS solutions tailored to meet the specific needs of the Australian Defence Force (ADF) and allied nations. Aligned with the 2023 Defence Strategic Review and US DoD guidelines for attritable and expendable UAS, Praetorian leverages a sovereign Australian supply chain, collaborating with domestic start-ups and SMEs. The company will export its cutting-edge technology to NATO, Quad, Five Eyes, and Indo-Pacific partners, strengthening global defence capabilities while addressing emerging threats from recent global conflicts.

praetorian-aeronautics.com

Privacy Seal is focused on enhancing information security in sensitive environments. Privacy Seal manufacture a product which disables the built-in microphones in iPads while maintaining otherwise full use of the device. Their product mitigates the highest risk that use of iPads in secure zones poses to practicing classified information, allowing a pathway towards approving their use in those zones

Prograde Engineering provides practical, high-quality mechanical design, analysis and certification solutions for a range of industries.
In addition to our core engineering work, we also develop custom digital training and simulation tools. One such capability is HUD Sim, an iPad-based app that replicates the heads up display and primary flight display of the Pilatus PC-21 aircraft. Designed to support pilot training and briefing effectiveness, it is currently in use within ADF pilot training schools and highlights our ability to combine engineering know-how with modern, purpose built app development.
Whether delivering mechanical designs or custom software tools, our focus remains on practical, reliable outcomes that meet the operational demands of our clients.

progradeengineering.com.au



We protect mission critical infrastructure using the power of Quantum Mechanics. Remote hardware in power plants, telecommunications platforms, and data center infrastructure has all been a target of advanced persistent threats. Quantum Lock can protect these critical assets by providing physics based security guarantees that the device has not been hacked.

quantumlock.com.au

REDACTED

Redacted Information Security is a Canberra based cyber and information security consultancy and offensive capability development company established in January 2022. With combined experience across Australia's government, private sector, law enforcement, military, and intelligence agencies, we are uniquely positioned to provide expert advice to your organisation.
NeonRiot, by Redacted, is a red team software platform for cybersecurity red team activities, adversary simulation, training and exercising.
With features for operational planning, team collaboration, skills development, command and control, exploitation, and more NeonRiot significantly lowers the barrier of entry to quality red team operations.

redacted.au

RedTail Technology

Redtail Technology produces the Katoomba sDEW, a small directed energy platform that provides counter-small uncrewed aerial system capability to dismounted warfighters and law enforcement. The Katoomba allows the user to choose to dazzle, blind or defeat small drone, protecting lives and assets. Dazzle and blind settings enable users to minimise the risk of collateral damage in populated areas. AI aim-assist helps fatigued soldiers under high cognitive load to precisely engage and neutralise threats. The Katoomba offers rapid training, low cost, interchangeable energy magazines, and can be used as a rifle attachment, a standalone system, or mounted to a turret.

redtailtech.com.au

RESDEMOU

Today, organisations and government agencies put all their documents in one big digital vault, and they secure that, meaning when an attacker finds one oversight and gets in, they get everything in one fell swoop. With Resdemou, everything from documents to real-time drone feeds is independently secured in its own digital "micro-vault", so even if an attacker gets into the main vault, they'd still have to break into every document individually, turning a network breach from catastrophic data loss into a contained and detectable incident.

resdemou.com

ROCKET FAST DRONES

At Rocket Fast Drones, our mission is to unlock the potential of the skies. We believe that drone technology can revolutionize industries and empower creators. Headquartered in Brisbane, Australia, we are at the forefront of developing innovative, fast, and intuitive drones that make aerial technology accessible to everyone. From streamlining logistics to capturing geospatial data, our goal is to provide the tools that power the future of flight.

rocketfastdrones.com

SABRN DEFENCE & SPACE

SABRN is an Australian-veteran-owned multifaceted, innovative, and purpose-driven Group of Companies.
SABRN was founded in South Australia, and has footprints in Adelaide (SA), Perth (WA), Brisbane (QLD), Canberra (ACT), and Bredbo (NSW – testing and training facility).
SABRN aims to provide maximal benefit to our planet and its inhabitants.
SABRN prioritises the health and wellbeing of individuals, communities and the planet, and aims to make effective healthcare for people available and affordable.

sabrntech.com

SAQQARA AEROSPACE

Saqqara Aerospace is dedicated to providing innovative aerospace solutions. Our portfolio includes advanced sensing technologies, uncrewed aerial systems, bespoke solutions, and turnkey consulting services—all built around precision and innovation. Headquartered in Australia, our mission is to combine advanced technology with practical applications to provide accurate and reliable data for various industries.
Our team of world-leading experts bring a wealth of experience, creativity, and passion for innovation. At Saqqara Aerospace, we believe in pushing the boundaries of what's possible and working collaboratively with our clients to achieve extraordinary outcomes.

saqqaero.com

SEITEC

Seitec specializes in advanced passive seismic systems for military and intelligence applications, enhancing operational efficiency and safety. UXOTrackS (Unexploded Ordnance Tracking System) can eliminate the risk of lost UXO on weapons ranges by using seismic sensors to detect, localize, and classify ordnance impacts across vast areas. Additionally, Nightingale repurposes the same hardware for footstep detection and tracking, providing real-time surveillance and incursion alerts. Seitec's solutions enable smarter, safer operations across a wide range of military environments.

seitec.com.au

Sentri

Sentri is a smart animal health monitor designed to enable animals to live healthier, happier and longer lives. It performs all the functions of a standard animal 'identity microchip' plus so much more. Through revolutionary biosensor technology, Sentri sets a new standard for animal healthcare by providing the earliest opportunity for intervention and effective treatment for better health outcomes.

sentri.com.au

solalinx

Solalinx, founded by Martin Hamilton, is an Australian deep-tech innovator delivering the LightEnhancer HLCS overlay. Integrating spectral-shifting nano-coated films, passive radiative-cooling layers and advanced concentrator optics, this sovereign snap-on retrofit boosts panel output by 25–30 %, cuts module temperature by up to 8 °C, and extends lifespan across defence and commercial rooftops.

linkedin.com/company/solalinx

Stratoship

Bringing the stratosphere within reach. Stratospheric observation technology can monitor natural disasters, changing environments, oil spills, deforestation, and more by providing an affordable satellite-like platform that can stay over the study area and provide a near real-time view. For Defence and Security Strotship's high altitude platforms can extend the range of radio networks and communications and reduce the need for ground-based stations. With the stratoship's ability to move and hold station, the ship acts as a dynamic remote platform, ready for any situation

stratoship.au

TAIPAN TECHNOLOGIES

Taipan Technologies Pty Ltd is advancing E-IDWR, a method that embeds density-matched inert inserts into existing Australian munitions to slash energetic fill yet preserve—or lift—lethality. We are pairing AI-driven hydrocode design with additive-manufactured inserts, moving through lab validation toward integration trials with local GWEO producers. The goal: expand output from current production lines, cut logistics mass, and deliver a rapid, sovereign performance upgrade for the ADF.

taipan-technologies.com

undatech

UndaTech is developing innovative undergarments to enhance safety, comfort, and performance for the Australian Defence Force, emergency services, and high-risk workers. These fire-safe garments integrate seamlessly with existing uniforms and equipment, offering protection while ensuring optimal comfort, mobility, and breathability. By addressing the unique challenges women face on the frontlines, such as menstruation management and adequate breast support, UndaTech's products reduce discomfort during extended periods of wearing heavy gear and performing under pressure. This enables women to focus on their missions, contributing directly to improved performance and survivability in dynamic, high-risk environments.

undatech.com.au

Uplift

Autonomous Air Logistics

Uplift Aero is disrupting logistics with the world's first autonomous zero emissions air logistics drone port. We are opening the skies for business to unlock opportunity anywhere, anytime.

uplift.ing


Additive manufacturing equipment funded by Defence Trailblazer at CSIRO Clayton.

TRL 9

FREE DOWNLOAD

Technology Assessment Toolkit

The Defence Trailblazer developed a Technology Assessment Tool and Technology Roadmap Canvas to help researchers, innovators and industry to determine the readiness level of a technology or capability in development, and to develop a technology development plan.

The Tool and Roadmap are most relevant to product engineering for defence applications, but each can also be used separately or together in other contexts.

Liz Kobold, Dr Thomas Gretzinger, Justin Stockl and Dr Steve Winnall all contributed significantly to the development of the Technology Assessment Tool and Technology Roadmap Canvas. We acknowledge and thank them.

For more information and to download, visit **dtb.solutions/technology-assessment-toolkit**

Proto-Lab Network & Technical Support Program

The Defence Trailblazer has established a Proto-Lab Network (PLN), a network of facilities, equipment, infrastructure, and know-how to assist the different stages of defence-related product development. This network will enable researchers and industry partners to access Australian design, prototyping, test and evaluation, and low-scale manufacturing capabilities.

SUPPORTING PARTNERS

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Industry and academia collaborating at the 2025 Defence Trailblazer Innovation Summit

University-Industry Collaboration

From inception, Defence Trailblazer aimed to demonstrate approaches that close the gap between university research and deployable capability, not just for Defence but as part of a broader national push to lift commercialisation performance under the Department of Education's Trailblazer Universities Program

Defence Trailblazer is positioned as a broker that speeds up collaboration and lowers the friction traditionally seen between academia and business. An embedded evaluation team is assessing outcomes in real time rather than waiting for a post hoc review, with early findings crediting Defence Trailblazer with forging direct, practical ties and generating substantial direct and indirect economic value.

Importantly for sovereign capability, Defence Trailblazer's portfolio maps to areas central to Defence and AUKUS Pillar II—from quantum and autonomy to advanced cyber—so that research momentum is aimed where Australia needs it most. Multiple projects illustrate this alignment, such as mixed reality training with Toll Group, quantum timekeeping and sensing with QuantX, and scale up of renewably powered uncrewed surface vessels with Ocius. Partners returning for follow on work suggest value creation, maturation and a pathway from prototypes to production.

Defence Trailblazer has proven it can make collaboration practical. Interviews with industry and university stakeholders point to clear gains in technology development, better IP handling and more predictable pathways from research to market. Targeted funding support and structured innovation activities have helped academics and companies—start ups, SMEs and major primes—co design pilots, sharpen go to market plans and reduce friction at handover points. These changes are visible in the way partners engage and in the discipline around commercialisation steps, giving the defence ecosystem a stronger foundation for repeatable university–industry delivery.

Enduring cultural change is emerging more slowly, and there is still work left to do. Different timetables and incentives still pull universities and industry in opposite directions, external partners see fewer signs of deep institutional change than university staff report, and there is uncertainty about who sustains the broker role once program funding ends. Closing these gaps—by aligning incentives, simplifying administration, strengthening communications and planning for post program stewardship—will be critical to lock in collaboration gains and translate them into lasting sovereign capability outcomes.

Industry Partner Index

DEFENCE TRAILBLAZER

A COLLABORATIVE PARTNERSHIP BETWEEN

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CYNDR
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ELECTRO BASE
SUPERCHARGE ANYTHING ANYWHERE
FMT
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