Defence and Research Teaming (DaRT) 2023

Information Pack

Introduction

The Defence and Research Teaming (DaRT) is a Western Australian Government initiative delivered by the Defence Science Centre (DSC) that seeks to foster engagement between industry and academia to address real world problems in the defence sector.

The aim of the DaRT initiative is to explore concepts and generate ideas to address emerging defence sector needs early in the Defence Capability Life Cycle. This initiative allows the defence sector to provide instant feedback on early concepts with successful design solutions receiving $20,000 - $200,000 in grant support.

The DSC invites 'Blue Sky' design thinking proposals to provide resolutions to the current problems encountered by the ADF across multiple services.

Key Components of DaRT

- Aim: Explore concepts and generate ideas to address emerging defence sector needs early in the Defence Capability Life Cycle.
- Grant Support: Successful design solutions could receive up to $20,000 - $200,000 in grant support.

- **Stages of Initiative**
  - 1. Information Session and Problem Set Delivery – 29 November 2023
  - 2. Expressions of Interest open – 29 November 2023 – 30 Jan 2023
  - 3. Assessment and Evaluation – end of Q1 2024
  - 4. Award of DaRT Grant – end of Q2 2024
  - 5. Delivery of Outcomes – end of Q1 2025

- **Expressions of Interest (EOI)**

Applicants are encouraged to collaborate across industry and academia to submit EOIs to the Defence Science Centre.

1. EOIs Open 29 November 2023 – 30 Jan 2024
2. Request for Information will remain open until 29 Jan 2024
3. 3 – 4-page summary of concept proposal
4. Technical Readiness Levels (TRL) 3-4 concepts accepted.
5. Applications for EOI can be found on the DSC website at: https://www.wa.gov.au/government/publications/dsc-defence-and-research-teaming-expression-of-interest

Assessment Criteria

- Novelty: The extent to which the proposed solution entails the delivery of a novel scientific, engineering, or technical output.
- Feasibility: The extent to which the proposed solution can feasibly be delivered given the proposed delivery approach and resources commitment (consumables; facilities; researchers; others).
- Value for Money: The extent to which the proposed solutions deliver an effective return on investment for the capability to be delivered.
- Effect: The extent to which the proposed solution will deliver effects that will increase or enhance the operational performance of the ADF.
- Collaboration: The extent to which the proposed solution encourages teamwork, knowledge exchange, and resource sharing.

THEME 1

Combating Top-Weight Creep in Naval Fleets

Naval fleets worldwide are grappling with "top-weight creep", a critical issue arising from the continuous addition of heavy systems and armaments to surface warships and corvettes. This top-heavy imbalance compromises their performance, manoeuvrability, and stability during combat.

To address this challenge, we must focus on optimising upper deck components design and reducing weight through innovative approaches like additive manufacturing and lightweight materials. The aim is to enhance vessel capabilities and survivability by redistributing weight and lowering the centre of gravity.

For this theme the key research questions to be addressed include optimising design without sacrificing integrity, exploring lightweight materials, and quantifying the impact on vessel performance. Successful concepts will receive support in advancing solutions to mitigate top-weight creep and improve naval fleet effectiveness.

Problem Statement 1

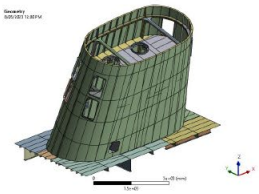
SEA5014PH1 is a Capability Assurance Program to support extending Navy's Anzac Class Frigates until the introduction of the Hunter Class Frigate.

Focus area:

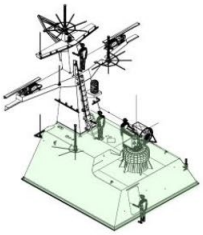
Maintain displacement and Vertical Centre of Gravity VCG) margins to accommodate growth.

Current Remediation Activities:

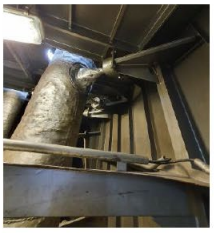
- ANZAC Class Funnel
- Forward Mast house
- Exhaust & Insulation
- Alternative Deck Coatings
- Additive Manufacturing
- Compensated Fuel Tank



Anzac Class Funnel

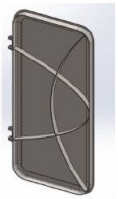


Forward Masthouse



Exhaust & Insulation

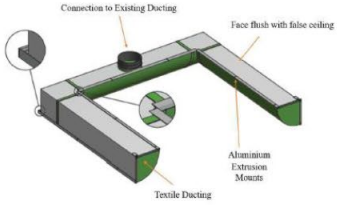
Alternative Deck Coatings



Additive Manufacturing

Compensated Fuel Tank

Composite glass reinforced plastic ladder



Feasibility Studies

Current Challenges

- Compliance to Anzac Class System Specifications.
- Technology Readiness Level.
- Engineering Change process.
- Demonstration of Value for Money.

THEME 2

Enhancing Stealth in Freefall Insertion Operations or Development of materials that minimise detection at freefall insertion.

Freefall insertion operations, crucial for Special Forces and covert missions, require materials that can significantly reduce personnel and equipment visibility to infrared (IR) and radar detection. These materials must absorb IR radiation and minimise radar reflection effectively.

For IR detection, materials need high IR absorption and heat dissipation capabilities while preventing reflection. Radar detection demands materials with low radar cross-section (RCS) to reduce echoes and enhance stealth.
For this theme the key research questions to be addressed include material properties for stealth, optimising IR absorption, reducing IR reflection, and innovative fabrication techniques. Successful concepts will receive support to advance solutions for safer and more successful freefall insertion operations.

Advancing Active Camouflage Technology

Traditional static camouflage patterns used by military personnel struggle to adapt to changing surroundings, making it easier for adversaries to spot them. Moreover, carrying equipment can disrupt the camouflage effect, compromising concealment. There's an urgent need for an active camouflage system that can dynamically adjust appearance to match the immediate environment, offering superior concealment and enhancing military personnel's survivability and mission success.
Key challenges in developing this active camouflage system include adaptive concealment, durability, power efficiency, and integration.

For this theme the key research questions to be addressed include how advanced sensor technologies can detect and analyse real-time environmental changes for effective adaptation, identifying responsiveness materials that can swiftly adjust appearance for optimal concealment, and designing a system capable of withstanding harsh conditions without compromising functionality or durability. Successful concepts

will receive support to drive advancements in active camouflage technology, improving military personnel's safety and mission effectiveness.

Problem Statement 2

Development of active camouflage system for clothing and equipment for ADF frontline combat units.

Current Challenges:

1. Seeking novel materials, unusual/covering broad visible/non-visible spectral properties.
    - Ideally dynamically adjusts appearance to match the immediate surroundings.
    - Protecting Individual dismounted soldiers and small craft
    - Maximised durability, reliability and power efficiency whilst minimising size and weight.

2. Minimise the reflection of incident visible/non-visible spectral radiation and thermal radiation during parachute and littoral craft operations.