

Integrated Air and Missile Defence



Key focus area – statement of work

Background

Effective and deployable Integrated Air and Missile Defence (IAMD) capabilities are a critical element of Australia's ability to defend itself; and to deploy military power to shape our environment, deter actions against our interests and, when required, respond with military force.

Developing and implementing a sovereign IAMD capability constitutes a number of existing capabilities and new projects. These will form a layered and networked capability with Sensors, Deciders and Effectors, able to link any suitable sensor to the most appropriate response. Evolution of the capability will be delivered through spiral evolution future projects, tranches and phases through the life of the IAMD Capability Program.

The IAMD capability shall respond to a broad threat set including Rockets, Artillery and Mortars (RAM), inhabited aircraft, Precision Guided Munitions (PGM), Un-crewed Aerial Systems (UAS), missiles (ballistic and manoeuvrable), and advanced high-speed weapons. The proliferation of ballistic and advanced high-speed weapons also means our deployed forces require enhanced deployable air and anti-missile defence systems when on operations. Defence is developing an IAMD Counter Threat Framework to improve categorisation of the threat set and to inform capability needs.

IAMD capabilities are a vital element of our defence strategy, with rapidly emerging and disruptive technologies offering Defence opportunities to improve its ability to perform the current roles and missions required. Automation, artificial intelligence, digitisation and modular technologies will enhance Defence's ability to operate in the most cost-effective manner possible in a drive for greater affordability and increased capability.

Context

The 2020 Force Structure Plan (FSP20) identified a need to develop IAMD capabilities to protect the joint force. In line with FSP20, the Government will continue to invest in support and upgrades for the E-7A Wedgetail airborne early warning and control aircraft, as well as the development of a joint air battle management system to better coordinate and synchronise Australian Defence Force (ADF) operations. FSP20 also identified the need to invest in upgrades to over the horizon radar capabilities as well as investment in new ground based air and missile defence systems, to counter ballistic and advanced high-speed missile threats. More recent studies available in the public domain also indicate a need for investment in elevated sensor and tracking capabilities that will be required to counter manoeuvrable and advanced high-speed missile threats.^{1,2}

Importantly – and in addition to active defence measures identified in FSP20 - investment in non-kinetic and passive defence measures are also required such as counter-ISR, camouflage,

¹ Saylor. K.M. (2022) *Hypersonic Weapons: Background and Issues for Congress*. CRS Report R45811

² Karako.T, Dalgren. M. (2022) *Complex Air Defence Countering the Hypersonic Missile Threat*. CSIS

concealment and deception (CCD), hardening (of Defence facilities and infrastructure), dispersal and post attack recovery.³

Defence is progressing design and delivery of the IAMD capability, through adoption of a sense, decide, effect (SDE) process. Defence will also implement key concepts such as decider collaboration, sensor netting and sensor/effector pairing.

Joint capability effects – including integrated fire control – will be optimised through the IAMD MDP management construct, requiring close coordination with cross-domain capabilities to be delivered by the Maritime Surface and Above Water Combat Capability Program (including upgrades to Hobart Class destroyers); and the Air Combat Capability Program, for example.

Introducing IAMD capabilities in line with the SDE process will require a range of technologies to be developed and introduced by multiple Projects within the IAMD Capability Program. Current IAMD Projects are summarised in 'The Australian IAMD Capability Program' handout (Official: Sensitive) (Click here to download). The scope of these Projects may require adjustment in future to support the development of a resilient IAMD Capability able to adapt to evolution of the threat.

Current Integrated Investment Program projects to this end include Air 6500 Joint Air Battlespace Management System, to introduce the core architecture for IAMD; Air 6502 for medium range ground-based air and missile defence, and Air 6503 to counter advanced and high speed weapons. While each of these projects will bring a range of systems and technologies into service, overcoming the technical challenges associated with integrating these into a complex system of systems will rely on how well Defence can exploit the innovation, knowledge and expertise across Australian Industry.

Scope

From 1 July 2022, the Defence Innovation Hub will seek submissions for innovative technologies that will increase IAMD capability effects, survivability and resilience. Technologies are expected to be capable of providing a high level of efficacy to contribute to a resilient IAMD capability able to keep pace with the air and missile threat set.

Specifically, the Defence Innovation Hub is seeking:

1. novel sensing solutions that contribute to awareness of air and missile threats, particularly advanced and high speed threats;
2. innovative technology solutions that enhance human decision making for the air and missile defence mission; and
3. innovative non-kinetic and passive defence technologies that disrupt, degrade or defeat adversary targeting and engagement or enhance own force survivability and resilience.

IAMD Sensor Technologies

Sensor technologies include systems and enabling technologies that detect and track threat systems independently and/or collectively. Sensor technologies may be passive or active; and may be terrestrially-based (land or surface) or elevated (on aircraft or satellites for example). The most effective sensor mix (active and passive) also needs to be considered.

Sensor technologies are a priority area of interest as the speed of emerging advanced missile threats reduce decision timeframes for conducting engagements: the earlier a threat can be detected and tracked, the more time is available to respond. Near-space trajectories, manoeuvrability and low-

³ Vick. A. (2015) *Air Base Attacks and Defensive Counters: Historical Lessons and Future Challenges*. RAND Corporation

observable technologies present increasing challenges for sensors to detect and track threat systems.

Technology areas of interest that may enhance the IAMD capability include:

- Novel sensing
- Networked sensing
- Elevated sensing
- Sensor fusion
- Low latency, resilient communications
- Predictive algorithms and associated technologies
- Discrimination and characterisation algorithms and associated technologies
- Artificial intelligence and machine learning

IAMD Non-Kinetic and Passive Defence Measures

Defence is seeking innovative non-kinetic and passive defence technologies that will disrupt, degrade or defeat adversary targeting and engagement; or enhance own force survivability and resilience. Passive defence measures are all those activities—other than Active Defence—taken to minimise the probability and effectiveness of adversary air and missile action by enhancing the survivability of friendly forces and installations.⁴

Non-kinetic and passive defence measures may mislead the adversary about the locations of potential targets and could include some or all of the following:

- ISR countermeasures that disrupt, degrade or deny detection and/or tracking of friendly forces
- Satellite navigation and position, navigation and timing countermeasures that disrupt, degrade or deny communication and/or guidance systems
- Countermeasures that defeat, seduce or decoy direct attack weapons during the terminal phase
- Camouflage, Concealment and Deception (CCD),⁵ including passive and active decoys (physical and electro-magnetic)^{6,7}
- Automated and autonomous mobility technologies

IAMD Decider Technologies

Decider technologies include systems and enabling technologies that consume information to determine a desired effect. Decider technologies are a priority area of interest and may enable data fusion, multi-sensor integration and track management, automation and decision support including machine learning and artificial intelligence, and decider collaboration.

Below are technology areas of interest that are needed, but not exclusive, to enhance IAMD platforms:

- Decider Fusion / Multi-Sensor Integration / Track management
- Automation & Decision Support
- Open Systems
- Multi-level Security

⁴ Department of Defence (2015) *ADDP 3.16 Counter Air*

⁵ Ibid

⁶ Tudor, C.G. (2019) 'Camouflage, Concealment and Deception in Military Operations' *International Scientific Conference "Strategies XXI"*. Issue 1 pp.350-361

⁷ U.S. Department of the Army (2010) *ATTP 3-34.39 (FM 20-3) Camouflage, Concealment, and Decoys*. U.S. Department of Defence; Karako, T & Rumbaugh, W. (2018) *Distributed Defence: New Operational Concepts for Integrated Air and Missile Defence* Centre for Strategic and International Studies

- Artificial intelligence and machine learning
- Counter Un-crewed Aerial Systems (UAS)
- Counter adversary swarming capability / systems
- Trusted Systems and Information Assurance
- Decider Collaboration
- Force Level Threat Evaluation and Weapon Assignment
- Near Real Time Cross Domain Solutions
- Modelling Simulation and Experimentation

Trials and testing

Tenderers may request access to Defence assets or information to support testing and demonstration events, however, access to missile defence systems will not initially be provided by Defence.

Indicative timeline

Stage	Estimated Date	Milestone
Call for Submission	01 July 2022	Call for Submission Opens
	31 August 2022	Submissions Close for KFA Funding eligibility.
Request For Proposal	*Individual Tenderer notification	Release of Request For Proposal
	February 2023	Tenderers notified of outcome

Total funding available

Defence has allocated up to AUD \$10,000,000 (GST exclusive) for this Key Focus Area over three years (2022-23 to 2024-25). Defence is under no obligation to fully expend this amount. Any investment decision under this procurement process will be made in accordance with the best procurement practices and guidelines to achieve value for money for the Commonwealth.

More information

For more information including how to make a submission as well as resources to assist you prepare visit: www.innovationhub.defence.gov.au