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ASCA Emerging and Disruptive Technologies – Decision Advantage

Overview, Technology Areas, and Opportunity Statements

The National Defence Strategy 2024 has identified “Achieve decision advantage” as one of the six key capability effects Defence is required to deliver. Decision advantage refers to the ability to process, analyse, and act upon information faster and more accurately than adversaries. This strategic edge allows for timely, well-informed decisions that can shape the outcome of conflicts, whether in conventional warfare, cyber defence, or grey-zone operations. In a world marked by rapid technological advancements, geopolitical tensions, and evolving security threats, decision advantage has become a fundamental necessity for the Australian Defence Force (ADF).

The accelerating pace of change in the global threat landscape, coupled with the increasing quantity, complexity, and distribution of information, makes achieving decision advantage increasingly challenging. To maintain its competitive edge, the ADF must harness emerging technologies such as artificial intelligence (AI), machine reasoning, and advanced data fusion capabilities to process the vast amounts of data and synthesise that information into actionable insights far more quickly than traditional methods. This capacity for faster and more accurate situational awareness will give the ADF a tactical and operational advantage.

Data and information-driven decisions are required across all levels of decision making – strategic, operational and tactical – and over all domains of the Defence enterprise, and often data needs to be brought together from multiple levels and domains. Technologies that produce decision superiority necessarily have potential for wide impact for asymmetric advantage across Defence. Defence needs to grow knowledge readiness to capitalise on breakthroughs, manage strategic and operational risks, and develop new decision-enabled capabilities. This demands new ways of thinking about the employment and exploitation of these emerging technologies. These technology innovations are not only force multipliers but also enablers that align with Australia’s broader national Defence strategies, including the recently announced Defence Innovation, Science and Technology Strategy, “Accelerating Asymmetric Advantage – Delivering More, Together”.

The Emerging and Disruptive Technologies (EDT) Program focuses on shaping and future-proofing the innovation ecosystem, through investment in long-term partnerships for the research and development of new technologies that may provide leap-ahead improvements to existing capabilities or new knowledge that helps identify opportunities for development of asymmetric capabilities for Defence. The EDT program is not required to deliver short-term acquisition outcomes, the aim is to explore the art of the possible and generate discovery, new knowledge, concepts, and prototypes.

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For this call to market, ASCA is looking for cutting-edge, innovative proposals that apply one or more of the following technology areas to the Opportunity Statements for Decision Advantage listed below, in or across any of the Defence domains (air, land, maritime, space, cyber).

For example: Using [one or more technology areas listed below] to achieve [identify game changing advancements to be gained] for [opportunity statement from below].

Technology areas of interest for application to the Opportunity Statements are the following:

- **Automated Data Integration and Interpretation (ADII):** Automating the search, retrieval, fusion, and analysis of large volumes of data generated from various distributed sources to facilitate situational understanding and decision-making.
- **Machine Reasoning:** Algorithms that mimic human-like reasoning to develop courses of action, plans, or solve problems.
- **Multi-Modal Data Fusion:** Fusing data from multiple modes (e.g. sensors, text, audio, or visual) to create a unified inferred view of a situation that facilitates decision-making and situational understanding.
- **Augmented Human-Machine Reasoning:** Enabling the collaboration or symbiosis between human intelligence and AI-systems to significantly enhance the speed and quality of human-machine reasoning, decision making, and problem solving. Developing trust between humans and machines in data interpretation and follow-on actions.
- **AI Agents:** Systems that operate either individually or collaboratively with humans or other AI agents, to perceive situations and make decisions to complete mission goals.
- **AI Multi-modal Foundation Model (MFM):** Models that can interchange information and context and be queried to generate multi-modal information (including context) in new situations represent a critical capability for future situational understanding. MFM provides one such capability to train suitable AI models using multi-modal data (e.g., text, images, audio, or video) to enable ADII for decision advantage.
- **AI Orchestration:** The process of integrating and coordinating AI models and tools to interact and function together to handle the linked tasks, and multiple different environments required to respond to increasingly complicated requests.

Opportunity Statements for Decision Advantage

Situational Awareness and Decision Support

Using the technology areas listed above and taking into account diverse, incomplete, siloed, multi-modal information sources across domains, within dynamic and contested (e.g., disrupted, denied,



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degraded, intermittent and low bandwidth) environments, and the need to prioritise critical and timely decision information:

1. How might we accelerate the Processing, Exploitation and Dissemination (PED) of sensor and operational data into accurate and relevant knowledge to improve the ADF's understanding of the tactical, operational, and strategic landscape in near-real time and enhance timely decision making across ADF platforms?
2. How might we enable decision makers to generate actionable and effective courses of action faster than adversaries across multi-domain operations at the strategic, operational, and tactical levels?
3. How might data fusion be coordinated with AI processes to enhance efficient coordination of distributed teams of Defence platforms and capabilities, such as Integrated C4 (Command, Control, Communications and Computers) and Distributed TEWA (Threat Evaluation and Weapons Assignment)?
4. How might we leverage and integrate predictive analytics, assured delivery systems, and AI to automate, predict, and optimise ADF supply chain and sustainment support (from repair schedules to equipment, resource distribution and the provision of health support) to enhance the resilience and agility of the ADF?

Information Warfare

Using the technology areas listed above and considering the complexity of multi-domain data, uncertain and incomplete information, and a potential adversary's use of advanced pattern detection, communication systems, and electronic warfare:

5. How might we anticipate, detect, identify, mitigate, and/or exploit deceptive tactics in adversary signals or behaviours?
6. How might we create and/or take advantage of vulnerabilities in adversary decision making and operations?