

Intelligence Mission Data & Virtual Reality and Graphics Applications – Additional Context

Date: 23 November 2020

Special Notice reference no: HUB-20-AIAD-001

Aim

This document seeks to provide industry with further context as to the overview of the specific Artificial Intelligence (AI) Challenge Statement HUB-20-AIAD-001 outlined by Defence.

AI in a Defence context describes the computational methods, techniques and systems used to solve problems and perform tasks normally requiring human cognition or intelligence. In some specific cases, AI can exceed the performance of humans; however, in general AI is currently limited to augmenting human cognition and intelligence, and assisting with automated tasks.

Trusted AI, when considered within an ethical framework that aligns to Australian societal values, can be applied to Defence autonomous systems and applications as a force multiplier to provide the following advantages:

1. Assisting in decision superiority or augmentation to make better and/or more timely military decisions;
2. Improving process or resource efficiency during planning and conduct of operations;
3. Processing, fusing and making sense of advanced and disparate sensor data from Air & Space, Land, Maritime, Intelligence & Cyber domains; and
4. Supporting the delivery of military effects in operations.

AI can also be applied in other Defence contexts such as image understanding (object recognition for search and rescue, threat detection, enhanced target recognition), intelligent decision making (data processing and fusion, for complex and large data volumes in logistics & transport optimisation and combat operations), artificial creativity (automated detection and management of potentially fake content, and narrative generation), natural language processing (language translation, conversational engines and sentiment analysis of military and public data) and physical automation (trusted autonomous systems and autonomous supply replenishment) [1].

In support of this Special Notice, Defence is interested in Australian industry AI solutions, approaches or enabling technologies in two areas: Intelligence Mission Data (IMD) and Virtual Reality (VR), including graphics applications, which are defined in the Challenge Statement.

Australian industry, including companies with no prior experience with Defence, is encouraged to lodge a proposal for this Challenge. Particularly those developing or providing RF solutions for telecommunications, mining or space industries, as well as VR, graphics and gaming industry representatives with experience developing AI agents and approaches to mimic real-world environmental dynamics and those with experience in real-world object or terrain modelling and generation of photorealistic imagery.

Intelligence Mission Data

As outlined in the Challenge Statement IMD is structured, multi-source data of an entity or object that is used to create programmable mission data files. These mission data files are used in different military platforms such as ships, vehicles and aircraft to provide situational awareness, survivability and countermeasures, and testing and simulation.

IMD can be used in human-in-the-loop (semi-autonomous) systems to autonomously identify objects of interest requiring operator involvement. Whilst, Human-out-of-the-loop (autonomous) systems can be used to enable

the autonomous identification of immediate survivability related battlespace threats, and subsequent reaction without operator involvement.

IMD comprises a range of different sources of information including commercial or public (non-military) systems, coalition systems and Australian Defence systems. This live dataset forms a data reference library for creating mission data files that may be uploaded to Defence platforms to support a mission. In a non-military context, IMD represents an ontology or schema that describes real-world entities or objects, and is composed of five functional categories of information that include:

- A. Characteristics and Performance data: this outlines platform operational capabilities and physical attributes. In a domestic context this could be local airport transmitter, location/height of the antenna and power rating.
- B. Electronic Warfare data: includes the assessed radio frequency (RF) emission parametric data. This might comprise the parametric data for a domestic flight surveillance radar at a local airport.
- C. Order Of Battle data: describes the designations, location and formation of assets and units including commercial and/or civilian. The NATO Allied Procedural Publication 6A (APP-6A) standard outlines the common nomenclature, hierarchy, taxonomy for describing Order of Battle.
- D. Geospatial Intelligence data: includes imagery and geospatial information.
- E. Signature data: distinctive characteristics that assist with platform identification.

These five functional categories can comprehensively describe an entity or object in the battlespace, and when augmented with sensors and AI systems, can provide semi-autonomous or autonomous effects to enhance operational effectiveness and survivability.

Virtual Reality (VR) and Graphics Applications.

In military applications, Virtual Reality (VR) and related graphics applications are employed for scenario/planning modelling, simulation, complex data visualisation, and training applications. The value of these applications in a military context has been limited as a result of the lack of realism provided by the respective technologies and subsequent experience.

The gaming and entertainment industry is rapidly driving improvements in VR and graphics hardware, photorealistic graphics, environmental modelling, spatial audio and haptic sensors to deliver more realistic and immersive experiences. Perceived realism is further enhanced through applications of AI that provide uncertainty and evolving behaviour and dynamics. Modern gaming and graphics applications have demonstrated the ability to model real world objects (and interactions) including terrain, cities, buildings, vehicles, aircraft, and ships; in some cases scanning the actual object or terrain.

To improve the value of VR and graphics applications for Defence modelling, simulation and training, there is a need to generate new immersive experiences that incorporate photorealistic imagery, environmental models, AI and real world object or terrain modelling. These experiences may be enabled by haptics to add to the immersion. Generation of photorealistic visualisations, environments and objects can be used to augment Defence modelling, simulation and training scenarios to improve training value and realism. These visualisations, environments and objects can also be used in limited cases to build synthetic data sets or augment existing data sets for image recognition tasks.

References

- [1] Moy G, Shekh S, Oxenham M and Ellis-Steinborner Simon, 2020, Recent Advances in Artificial Intelligence and their Impact on Defence, Technical Report DST-Group-TR-3716,
https://www.dst.defence.gov.au/sites/default/files/publications/documents/DST-Group-TR-3716_0.pdf

INTELLIGENCE MISSION DATA SPECIAL NOTICE (HUB-20-AIAD-001)



WHAT IS INTELLIGENCE MISSION DATA?

Intelligence Mission Data (IMD) is structured, all-source intelligence data that supports creating reprogrammable data libraries for warfighting platforms. These data libraries enhance mission success by supporting situational awareness, countermeasures and survivability.

IMD models are agnostic, meaning they are able to be used in support of reprogramming any ADF platform or capability. The reprogramming community is able to use the IMD models to inform data library production, benefitting from detailed models that inform and detail the parameters required for populating libraries.



HOW DOES DEFENCE USE IMD?

IMD models enter a data library via reprogramming. These reprogrammable data libraries are then loaded into an ADF platform's sensors and systems, to support effective employment of capability. IMD dependent data libraries support informed and timely decision making, and makes the platforms responsive to a changing battlespace.

It further supports interoperability with the Joint Force, sharing battlespace awareness and real time information with other ADF capabilities.



DEFENCE ENGAGEMENT WITH INDUSTRY

IMD engagement with industry will work to increase production capacity and capability; greater amounts of data analysis, quicker production and higher fidelity models. Working with Industry, Defence seeks to generate a partnership and develop capability for the future. Engagement will be ongoing and continue to grow as new requirements emerge.



Defence Innovation Hub

SPECIAL NOTICES



WHAT ARE SPECIAL NOTICES?

From time to time, Defence has particular capability needs or would like to explore the development of a particular type of technology. When this need arises, the Defence Innovation Hub will publish a Special Notice on the Defence Innovation Portal. As a challenge-based solicitation, this type of notice typically contains targeted information about the types of technologies Defence is seeking.

By tapping into the innovative capacity of Australian industry, academia and research organisations, Special Notices provide an avenue through which Defence can solve challenges, explore new opportunities and develop advanced capability.



HOW ARE SPECIAL NOTICES DIFFERENT?

Special Notices are only open for a prescribed period of time. Depending on Defence's need and the intent of the notice, some proposals will undergo a two stage evaluation process and others, just one.

Special Notices adhere to a strict time frame whereby preferred proposals can move into contract within about 6-8 months. Depending on the terms of the notice, most proposals funded under a Special Notice need to be completed within a 12 month timeframe.

The procurement activity is narrow in scope and proposals must address a specific Challenge Statement. This means there is a greater level of involvement with the end users and capability areas to develop your particular technology following the award of a contract.



HOW DO I RESPOND TO A SPECIAL NOTICE?

The [Defence Innovation Portal](http://www.innovationhub.defence.gov.au) (www.innovationhub.defence.gov.au) acts as Defence's digital marketplace when it comes to advertising innovation opportunities for industry. The Defence Innovation Hub Portal provides an easy to use gateway between Defence, industry, academia and research organisations and is the only entry point to respond to these notices and submit proposals.

To receive an email notification when a Special Notice is released, you can register an account on the [Defence Innovation Hub Portal](http://www.innovationhub.defence.gov.au) at any time.



DEFENCE INNOVATION HUB

RFP Evaluation Criteria

At the Request For Proposal (RFP) stage, all Proposals are evaluated against the following criteria with all criteria being equally important. The evaluation criteria allows Proposals to be evaluated individually and in comparison with other Proposals, in order to make informed recommendations for investment. The RFP evaluation criteria may differ slightly between activities and are found in the RFP Terms relevant to the procurement.

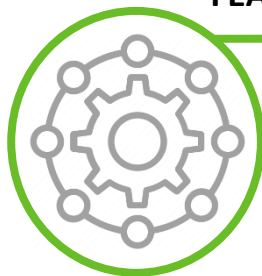
SUITABILITY



The extent to which the proposed innovation could further the effectiveness of a Defence capability, enterprise or technology challenge. Defence considers:

- ◆ whether the proposal clearly articulates and explains the proposed innovation;
- ◆ the extent to which the proposed innovation is unique, and would provide a new or enhanced capability;
- ◆ whether the proposed innovation improves Defence's effectiveness and/or efficiency; and
- ◆ for Special Notices, proposals will be evaluated against the alignment to the Challenge Statement.

FEASIBILITY



The extent to which the proposed innovation will be able to be developed and adopted with relevant defence systems, from a technology perspective. Defence considers:

- ◆ the current technology readiness level of the proposed innovation, and the relevance and credibility of any claims made in relation to its feasibility;
- ◆ the level of effort that is required to implement the proposed innovation into the relevant Defence system or platform; and
- ◆ the extent to which the proposed innovation can be applied to a platform or system that is readily available for modification.

TIMELINESS



The anticipated timeframe that the proposed innovation would require to realise a positive impact on Defence capability. Defence considers:

- ◆ the extent to which the proposed timeline and duration of the proposed innovation aligns with timelines for any Defence capability requirements or related activities Defence is undertaking; and
- ◆ for Special Notices, proposals will be evaluated against alignment to the timelines in the Challenge Statement.

Defence Innovation Hub

RFP Evaluation Criteria

CONTRIBUTION TO AUSTRALIA'S DEFENCE INDUSTRY CAPABILITY & CAPACITY



The extent to which the proposed innovation will improve or contribute to Australia's defence industry capability and capacity. Defence considers:

- ◆ the extent to which the project will facilitate the retention and/or creation of jobs within Australia ('capacity'); and
- ◆ the extent to which the skills and technologies developed through the project align with Defence's sovereign capability priorities ('capability').

COST



The cost of the proposed innovation, including contract price, Defence items and any other costs to Defence.

ORGANISATIONAL CAPABILITY & CAPACITY



The extent to which your organisation is capable of, and has the capacity to, successfully progress the proposed innovation. Defence considers:

- ◆ extent of the project management capability of your organisation and appropriateness of any proposed or existing governance arrangements;
- ◆ the financial and corporate viability of your organisation; and
- ◆ the previous performance of your organisation and their key personnel in delivering similar projects or services.

Defence Innovation Hub

Allowable Costs

Innovation contracts are flexible and tailored to each innovation project. Innovation contracts are awarded through a competitive open tender process and each proposal will be evaluated on the likelihood of achieving Value for Money for the Commonwealth. Innovation contracts are 'Cost Reimbursement Contracts' which means that only those costs incurred by organisations directly related to research and development activities will be covered by the Defence Innovation

ALLOWABLE COSTS



Allowable costs include those that are expected to be incurred during the project such as:

- ◆ direct research and development costs;
- ◆ salaries for nominated resources for the period of the project;
- ◆ salary on-costs (e.g. superannuation, leave loading and payroll tax);
- ◆ cost of materials and technology necessary for project completion (apportionment is required if technology purchased has a lasting benefit to the organisation after project completion); and
- ◆ direct overhead costs such as employee administrative overheads (e.g. computing and stationery).

UNALLOWABLE COSTS



The Defence Innovation Hub does not fund profit or indirect overheads. Examples of unallowable costs include:

- ◆ profit margin(s);
- ◆ contingencies or reserves; and
- ◆ indirect overhead costs that cannot be justified as directly relating to the development of innovative technology (e.g. equipment depreciation, utilities and corporate headquarter costs).

The Defence Innovation Hub will determine what costs are allowable and reasonable. Costs associated with a Defence Innovation Hub project should meet contract requirements, withstand public scrutiny, be consistent with other sectors or market benchmarks and be consistent with good business practice.

For further information or clarification, please email: hub@innovation.defence.gov.au



FREQUENTLY ASKED QUESTIONS



Artificial Intelligence Applications in Defence 2020 (AIAD20)

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About the Proposal

Q: How much detail do I need to provide?

A: When completing the Request For Proposal (RFP) pack, please ensure you complete all mandatory fields. You must ensure all minimum submission requirements are met in accordance with the Cover Letter and RFP Terms included in the RFP pack.

Q: What is the level of funding available?

A: Defence has allocated up to \$10,000,000 (GST inclusive) for this procurement, however, Defence is under no obligation to fully expend this amount. A decision by Defence to invest in any given Proposal will be made in accordance with procurement best practice, legislative guidance and consideration of Value for Money outcomes for the Commonwealth.

Q: Can I submit a Proposal which includes Key Subcontractors?

A: Yes. Defence encourages collaboration when exploring innovative technologies. As part of your Proposal, you will need to list all Key Subcontractors you intend working with. This can include the work they will undertake, the Intellectual Property (IP) arrangements between you and the portion of funding to be allocated to Key Subcontractors.

Q: Who can I talk to about my Proposal?

A: Should you have questions about how to write your Proposal, please contact the Office of Defence Industry Support (ODIS) at odis@business.gov.au. If you have specific questions about the AIAD20 Challenge Statement, please contact the Defence Innovation Hub at hub@innovation.defence.gov.au



About the Special Notice

Q: What outcome does Defence expect from this activity, i.e. what does success look like for Defence?

A: The AIAD20 Challenge Statement seeks innovative Proposals that will result in a demonstration proof of concept with Defence within 12 months from contract commencement.

Q: Can I submit a Proposal even if I have not worked with Defence before?

A: Yes. Organisations with no prior experience working with Defence are strongly encouraged to submit a Proposal.

Q: Will larger organisations be favoured over smaller organisations?

A: No. All Proposals received by Defence will be treated equally, irrespective of organisational size.

Q: How can I find out more about what Defence is looking for through this Special Notice?

A: Defence has prepared general information on the application of Intelligence Mission Data and Virtual Reality which can be accessed through the Resource page. Specific questions regarding the AIAD20 Challenge Statement should be emailed to hub@innovation.defence.gov.au



About the Process

Q: When will I know the outcome?

A: The outcome of the AIAD20 Challenge Statement will be communicated in April 2021.

Q: If my Proposal is successful, what happens with any IP developed?

A: In general, IP developed in relation to a Defence Innovation contract stays with you, unless particular circumstances apply. For more detail please see the Hub's Intellectual Property Strategy available at:

https://www.dst.defence.gov.au/sites/default/files/basic_pages/documents/Innovation-Hub-IP-Strategy.pdf

Q: Can I get an extension of time to submit my Proposal?

A: No, all Proposals must be submitted by the close date, see below for further details.

Q: Do you accept Proposals after the due date?

A: No, all Proposals must be submitted by no later than **12:00pm (AEDT) 11 February 2021** For guidance on how to submit your Proposal, please refer to the instructions located on your Defence Innovation Hub Portal account 'Dashboard'.

Q: How do I submit my Proposal?

A: Proposals are to be submitted via the Defence Innovation Hub Portal, which can be found [here](#). You will need to log in or create an account in order to do this. We recommend you set up your account early.

Q: How are Proposals evaluated?

A: Proposals are evaluated competitively (this means against each other) according to six common criteria. To find out more about how your Proposal will be evaluated please see the RFP Evaluation Criteria Fact Sheet or the AIAD20 Challenge Statement as found on the Defence Innovation Hub website [here](#).

Q: Do I need a Security Clearance to submit my Proposal?

A: Generally no, however, organisations lodging Proposals as part of the AIAD20 Challenge Statement should be aware of Defence's security requirements. To find out more about how to obtain membership of the Defence Industry Security Program and the associated requirements please visit the [DS&VS website https://www.defence.gov.au/DSVS/Industry/](https://www.defence.gov.au/DSVS/Industry/)

Q: What happens after I submit a Proposal?

You will receive an email confirming that the Defence Innovation Hub has received your Proposal. If you don't receive this confirmation email, contact us as soon as possible at: hub@innovation.defence.gov.au

Upon successful submission of a Proposal, Defence will commence evaluating your Proposal and provide an outcome in April 2021.

Q: Who can I talk to if I have trouble submitting my Proposal or with the Defence Innovation Hub Portal?

A: If you have questions regarding the lodgement of your Proposal on the Defence Innovation Hub Portal, please email us directly at hub@innovation.defence.gov.au