

# Hazardous Agents Challenge

2021

## Information for Applicants

### About the Challenge

#### Strategic Context

The threat of chemical and biological attacks against military forces and civilian populations is growing, as state and non-state actors increase their knowledge in the area of threat agent production and their willingness to use chemical and biological weapons.

#### Capability Requirements

To enhance the Australian Defence Force's capability to respond faster and more flexibly to chemical and biological threats, the DSI-HAC is exploring new options to achieve enhanced situational awareness and human resilience in complex, contaminated environments. With this call the DSI-HAC is looking to invest in new technology in the following areas:

**Wearable Sensors:** Lightweight, low power, reliable and accurate sensors for either environmental monitoring or physiological assessment in response to chemical or biological agents. Wearables should respond rapidly and be simple to use and interpret. Networkable individual systems may enhance broader situational awareness. Wearables may be disposable, reusable or incorporate disposable elements to achieve their aims. Wearables may be a single device or multiple devices working together to provide an overall picture. An area of interest is the broad use of low cost, low fidelity combined with small numbers of high fidelity, more specific platforms.

A matrix of options for wearables is shown below – you may be able to meet some or all of the needs. We welcome combined outcomes:

|  |   |
|--|---|
| Real-time physiological response measurement to chemical agent exposure                                      | Real-time sampling and disclosure/alarm for chemical agents in the immediate environment. |
| Passive capture of biological agents with/without disclosure, for secondary assessment                       | Real-time capture and or disclosure of biological agents in the immediate environment     |
| Near real-time, pre-symptomatic, non-invasive biomarker measurement of response to biological agent exposure |   |

**Deployed Surveillance:** Lightweight, low power, sensors for chemical and/or biological agents which can be remotely deployed by a variety of means including autonomous vehicles for advanced surveillance to detect and identify chemical and biological threats. These may be either lower fidelity, targeted systems for a single species or higher fidelity, broader technologies capable of interrogation and determination of a broad range of materials. Devices must be able to be part of a wide-area heterogeneous sensor network for anomaly detection and reporting. We welcome innovations at both the individual sensor level and the wider network level.

**Warfighter Resilience:** The translation of data gathered from non-invasive wearables into actionable insights that would enhance the warfighter's ability to predict and extend their capacity to perform their mission under the threats and stresses characteristic of operating in a contaminated environment, eg agent exposure, CBR suit thermal load, etc.

## **Target Agents**

### **Chemical detection**

Many of the chemical agents of concern for the DSI-HAC are covered within the OPCW schedule 1 and schedule 3 lists, accessible via <https://www.opcw.org/chemical-weapons-convention/annexes/annex-chemicals/annex-chemicals>. Suitable, low toxicity simulants for many of these materials exist and are available for testing and evaluation purposes, however the type of simulant required can vary upon the type of detection technology employed. DST Group can advise successful applicants on a range of suitable simulants where required.

System functionality should also be demonstrated on a range of toxic industrial chemicals. Some examples in each class are provided below:

Toxic industrial chemicals – i.e. Chlorine, Ammonia, Formaldehyde, Ethylene Oxide, Sulfur Dioxide.

### **Biological detection**

Biological detection capability may be demonstrated using any low to medium biosecurity level 1-2 organism. Suitable systems may include:

Low Biosafety Level (1 or 2) Biological Pathogens - E.coli, Staphylococcus, Salmonella, Plasmodium falciparum, influenza A

It is understood that the maturity of technology in various areas of the DSI-HAC callout may vary. For this reason, different expectations will be placed on demonstration dependent upon the target and capability driver. It is also understood that one technology platform may be applicable to multiple capability drivers.

### **Expected delivery**

The expected outcome for funded proposals will be experimental proof of concept demonstration of chemical or biological detection in a laboratory environment using a prototype wearable or deployed outcome meeting the capability requirements for the callout and aligned to at least one of the [three operational vignettes](#).

The expected [technology readiness level](#) is 3-4 and will represent a [minimum viable product](#) with sufficient functionality for Defence specialists to make a preliminary assessment and provide feedback for potential future refinement. Systems presented for demonstration above TRL 4 would be welcomed and we actively encourage this.

In return we will work to align promising new technologies with suitable future funding sources wherever possible. Existing technologies that might be realigned to meet the needs of this call are also open for investigation. In this case we understand that current equipment TRL levels may be suppressed when redefining equipment and demonstrating in a new area.

Projects are for a duration of 6 – 18 months.

For more information on expected outcomes, definitions of terms, requirements etc, please refer to the document: **DSI-HAC Definitions and Guidelines**, available via the application form.

### **Closing Date**

Proposals are to be submitted via the [online form](#) by midnight (AEST) **Wednesday 12<sup>th</sup> May 2021**

## Selection Criteria

1. Alignment with Defence Requirements (see above) and expected enhancement to ADF's ability to operate in CBRN environments – 30%
2. Feasibility of the approach, likelihood of success (evidence base: track record etc) – 20%
3. Novelty of innovation, originality of research – 20%
4. Extent of cross-disciplinary/cross-border collaboration – 15%
5. Alignment with submitting organisation's R&D priorities and strategic aims – 15%

Co-investments (cash or in-kind) by applicants and/or their partners will be considered favourably.

## Eligibility

Proposals are sought from Australian universities, businesses, research organisations and PFROs (excluding DSTG). Proposals **must** include at least **two** collaborating organisations, of whom at least **one** must be based in Victoria or Tasmania.

Please see the Conditions of Funding for Citizenship and Security requirements concerning nominated personnel on the proposal.

## Conditions of Funding

- Personnel involved in the project must be resident in Australia and either
  - an Australian citizen
  - an Australian Permanent Resident
  - a New Zealand Citizen resident in Australia on a Special Category Visa (subclass 444)

Proof of citizenship or permanent residency status must be provided if requested.

- Residents in Australia on a Temporary Work Visa may be approved for participation in the project in exceptional circumstances.
- Project personnel must agree to be subject to a Security and/or Police check if requested and receive a favourable assessment before being allowed to commence work on the project.
- A licence to use the intellectual property developed as part of project must be provided to the program sponsor, DSTG, via IP Licence Deed. This licence will be for Commonwealth Use purposes.

## Intellectual Property

Ownership of intellectual property developed using the funds will be retained by the successful applicants. All successful applicants will be required to grant a licence to the Commonwealth to use project intellectual property for Commonwealth purposes, via an [IP Licence Deed](#). The contracting organisation will be provided with IP licence deeds to facilitate collaborating partners providing an IP licence directly to the Commonwealth.

## Contracting Information

Successful projects will be contracted by DSI through the University of Melbourne and the nominated contracting organisation. The nominated contracting organisation must be based in Victoria or Tasmania and will be responsible for any further agreements that may be needed to undertake the project. While the contracting organisation will usually be the employer of the Lead Investigator, this may not always be appropriate. If the Lead Investigator is located outside of Victoria or Tasmania, a Victorian or Tasmanian collaborating partner will be the contracting organisation. Please make sure you have agreed who will be the contracting organisation and that they have an opportunity to view the sample agreement and IP licence deed.

The [grant agreement](#) for this project is subject to a head agreement with the Commonwealth and as such there is no scope for negotiation on individual terms outside of the project schedules. Please ensure your organisation is comfortable with key obligations such as IP, security and compliance with Commonwealth legislation.

## Project Outcomes and Deliverables

Applicants are asked to nominate suitable outcomes and deliverables appropriate to their project aims. These will vary depending on the stream and topic focus and the nature and length of the project. Nominated outcomes and deliverables should be at [Technical Readiness Levels](#) (TRL) 3-4 or above.

All projects will be required to provide a technical report at the end of the project and present on the work to members of the Defence community. A post-grant report will be required 12 months after project completion. Longer projects will also be required to provide progress reports.

## Completing the Proposal

The proposal is to be submitted via the [online form](#).

The call is looking for projects of varying scale. The amount of detail and documentation in your proposal should be commensurate with the size of your proposed project.

*Lead Investigator* - The Lead Investigator will have overall responsibility for the research direction of the project. The employer of the Lead Investigator will usually be the contracting organisation. If you are not based in Victoria or Tasmania, contracting will be done through one of your Victorian or Tasmanian collaborators. We will contact you to confirm those details later, if needed.

*Research Proposal* – the research proposal is to be uploaded as a pdf of no more than **5 x A4 pages** excluding references. Your proposal should include

- a brief statement of the research problem you are addressing and how solving this will contribute to meeting the capability requirements of the stream;
- a description of the minimum viable product demonstrator you are aiming to achieve
- the approach you will take to the problem and why you believe this will work
- how you will know you have succeeded in your approach, and for longer projects, how will you know you are making progress along the way
- a brief statement on the alignment of this project with the R&D priorities and strategic goals of your organisation. As Defence is interested in developing long-term relationships and building national capability this gives an indication of how your organisation views potential future involvement.

*Budget and Deliverables* - the spreadsheet includes 2 worksheets – one for the personnel and budget and one for the milestones and deliverables. Both sheets must be completed. More rows can be added to sections if needed. [Download here.](#)

The budget should include all nominated personnel who will work on the project, both those who will receive their salary from the grant and any who will be in-kind contributors. Salary costs can be claimed for all personnel involved in the project. There is no requirement for an in-kind contribution of personnel.

Make sure that the funding requested for personnel includes all applicable on-costs plus salary at the rates that apply in your institution and state eg superannuation, pay-roll tax, workers compensation insurance, leave loadings etc.

The citizenship details must be provided for any named personnel. Select their status from the drop-down menu. If 'Australian Citizen' is selected, the country of citizenship will automatically be shown as 'Australia'. Other countries of citizenship must be manually entered. For proposed new positions that will have to be recruited, include the organisation where you are planning to employ them (if decided) and leave the citizenship cells empty.

While there is no requirement for in-kind or cash contributions to the project, they will help to demonstrate the alignment between this project and your organisation's long-term plans in the space. Please include any contributions if they are being made. The name of the organisation making the contribution is to be included in column H (Notes).

A brief justification for requested funding items is to be included in column H.

For projects requesting funding of \$75,000 or more, a default 20% of direct expenditure is allowed for indirect/overhead cost recovery. The spreadsheet will automatically calculate the indirect costs for you. If you are claiming less than 20%, this can be overwritten in cell G5.

For projects requesting less than \$75,000 funding, indirect cost recovery will not be allowed, in line with DSI's general overhead policy. The spreadsheet will automatically calculate your indirect costs as \$0.

Project funds cannot be used to pay stipends for students and can only be used to fund salaries for temporary visa holders in exceptional circumstances, if approved.

Proposed project milestones and deliverables are to be entered on the second page of the spreadsheet. Milestones should be sufficient to gauge how well the project is progressing over time.

All projects will be required to provide a report and presentation at the end of the project and a post-grant report 12 months after completion. Longer projects will be required to provide progress reports. At least one other deliverable must be nominated that is suitable for assessment.

*Collaboration Statement* – the collaboration statement is to be uploaded as a pdf document of no more than **3 x A4 pages** summarising the strengths and experience of the key project members and/or organisations, demonstrating why this collaborative team is well-placed to achieve the project aims and outcomes - how do you complement each other's skills? Have some of you worked together successfully before? Are you a new team which brings together vital collaboration experience in other areas and applications? Do some of your team members have a lot of experience in multi- or trans-disciplinary projects?

*Research Publications and Patents* - You may also provide an additional **2 x A4 pages** of relevant research publications and patents by team members. This is not compulsory.

## Questions?

If you have any questions which aren't answered here, in the FAQs or the associated documents, please contact [DSI-HAC21@DefenceScienceInstitute.com](mailto:DSI-HAC21@DefenceScienceInstitute.com)