

# Centre for Defence Enterprise

*The Centre for Defence Enterprise (CDE) funds novel, high-risk, high-potential-benefit research. This is from the broadest possible range of science and technology providers, including academia and small companies, to develop cost-effective capabilities for UK armed forces and national security.*

## Themed competition: detection of airborne chemical hazards



This CDE themed competition seeks novel technical approaches and breakthroughs to improve the information available to UK armed forces about the presence and nature of airborne chemical hazards.

The total funding available for this CDE competition is £500,000.

**Competition networking event:** Tuesday 22 July 2014  
at De Vere Canary Wharf, London, 9:30am to 4:30pm

**Competition close:** Thursday 11 September 2014 at 5pm

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Proposals for funding must be submitted by **5pm on Thursday 11 September 2014** using the [Centre for Defence Enterprise portal](#). Please mark all proposals for this themed competition with '**Detection of airborne chemical hazards (+ challenge 1, 2 or 3)**' as a prefix in the title (see 'Technology challenges' section below for a description of the challenges under this competition).

- **Technical queries** should be sent to [cbrcde@dstl.gov.uk](mailto:cbrcde@dstl.gov.uk) with '**Detection of airborne chemical hazards**' in the email title. Please see guidance on using this facility under the 'Queries and help' section.
- **General queries** (including how to use the portal) should be sent directly to CDE at [cde@dstl.gov.uk](mailto:cde@dstl.gov.uk).

# Detection of airborne chemical hazards

## Background

UK armed forces are at the core of the nation's security<sup>1</sup>, aiming to protect the UK from internal and external threats. These threats may involve the deliberate release of a chemical warfare agent (CWA) or other toxic material. The disruptive, destructive and potentially devastating effects of these materials pose unique challenges to military operations. The ability to detect these materials is a crucial aspect of force protection<sup>2</sup> as it allows protective measures to be deployed. This enables effective military operations to continue in a chemically hazardous environment. The detection of airborne chemical hazards is an essential part of a wider detection system supporting military roles involved with locating, monitoring and managing the hazard.

## Technology challenges

This competition aims to reach out to all sectors for novel technical approaches and breakthroughs to improve the information available to UK Armed Forces about the presence and nature of airborne chemical hazards. Detection methods deployed in the immediate vicinity of a hazard will be considered, as will those at standoff distances.

Proof-of-concept research proposals are invited that offer innovative means of detecting and identifying airborne (vapour and/or aerosol) chemical hazards. Proposals are required to meet one or more of the following core challenges:

- high selectivity
- high sensitivity
- the potential to detect a broad range of threat materials

The Ministry of Defence (MOD) has a longer-term aspiration that the following criteria will be met:

- fast response
- small size
- low weight
- low consumable burden
- wide dynamic range
- low false-alarm rates

Proposals should describe how these aspects will be addressed in future stages of development.

Your proposals should offer an advance in at least one of the core challenges, but could offer a level of performance against all of the core challenges. We understand, however, that by optimising a technology against one of the challenges, performance against one of the other challenges may be impaired.

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<sup>1</sup> Joint Doctrine Publication 0-01 British Defence Doctrine 4<sup>th</sup> Edition, November 2011:

<https://www.gov.uk/government/publications/jdp-0-01-fourth-edition-british-defence-doctrine>

<sup>2</sup> Joint Doctrine Publication 3-64 Joint Force Protection, April 2010: <https://www.gov.uk/government/publications/jdp-3-64-joint-force-protection>

### **Challenge 1: producing a highly selective way of detecting airborne chemical hazards**

In a chemical incident, appropriate protective measures must be taken to mitigate against the hazard to protect personnel and maintain operational effectiveness. Understanding the nature of the threat is critical in deciding on the right response. The more that is known about the hazardous materials involved, the better targeted the protective response can be.

This competition seeks a detection technique to find out if a toxic material is present. It should, as a minimum, classify the material, ie provide enough information on the nature of the material to allow decisions to be made on how best to manage an incident. Ideally the detection technique would identify the molecular composition of the material/s present.

### **Challenge 2: producing a highly sensitive means of detecting airborne chemical hazards**

In the event of a chemical attack, protective measures must be taken quickly to protect personnel and maintain military effectiveness. To provide timely warning, an alarm must be given at a level lower than the hazardous level to trigger the use of these protective measures. Your proposal must show the potential for a timely warning at a concentration of hazardous chemical equal to AEGL-3 (Acute Exposure Guideline Level<sup>3</sup>) for a 10-minute exposure, and preferably at a AEGL-1 for a 10-minute exposure. Any technique being developed for the detection of aerosol particles, should aim for the size range of 0.1 -10 µm.

### **Challenge 3: producing a technology with the potential to detect a broad range of threat materials**

Currently, threats are likely to arise from the proliferation of chemical, biological, radiological and nuclear weapons and their means of delivery. The range of materials to be detected is therefore broad and is likely to change in the future. We are looking for techniques that have the potential for detecting a wide range of different threat materials and methods that can be modified quickly to include new threat materials.

Airborne chemical threats can be present as solids, liquids or gases. Techniques that target the detection of materials in just one of these phases will be considered, however techniques that address more than one are preferred.

The specific materials to be detected will change over time as the threat changes, but it is likely to include CWAs (nerve, blood, choking and blister agents)<sup>4</sup> as well as toxic industrial chemicals.

#### What we want

We are seeking highly innovative proposals to demonstrate proof-of-concept of an initial idea. Low technology readiness level (TRL)<sup>5</sup> concepts will be considered that address the technical challenges described above. A practical demonstration of the technique at the end of the phase of CDE-funded research is required as a deliverable.

An agile technique is sought, which has the potential to adapt to meet changing threats.

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<sup>3</sup> Acute Exposure Guideline Levels, US Environmental Protection Agency: <http://www.epa.gov/oppt/aegl/index.htm>

<sup>4</sup> Organisation for the Prohibition of Chemical Weapons, types of chemical agent: <http://www.opcw.org/about-chemical-weapons/types-of-chemical-agent/>

<sup>5</sup> For a description of TRLs see in the Acquisition Operating Framework: <https://www.gov.uk/acquisition-operating-framework>

## What we don't want

Proposals based purely on a paper study of the concept won't be considered.

Proposals based on generic detection of vapour or aerosol won't be considered, as these provide no information on whether a hazardous material is present or the nature of the hazard. For example, we're not interested in techniques that only detect an increase in aerosol concentration against a background level.

## Exploitation

Each project will be assigned a Technical Partner in Dstl who will provide the interface between the project and the defence and security community and will assist with developing potential routes to exploitation within the defence community if appropriate. Potential routes could include additional research funding to further develop the concept to a higher TRL for MOD programmes or other UK government organisations.

Each project team will be invited to attend a stakeholder day, to be held at Dstl Porton Down, to present the outcomes from the project and review exploitation routes.

Dstl intends to take a number of the most successful projects forward for phase-2 funding. Up to £500,000 will be made available for this second phase and funding will be considered on a per-project basis.

## **Invitation for CDE proposals**

**This competition will be supported by presentations given at the networking event on 22 July 2014. These will be available to view via: [http://www.science.mod.uk/events/event\\_detail.aspx?eventid=307](http://www.science.mod.uk/events/event_detail.aspx?eventid=307).**

Proposals are invited from industry and academia in the UK and overseas for research that can demonstrate a proof-of-concept to meet 1 or more of the challenges for '**detection of airborne chemical hazards**'.

There is no cap on the value of proposals but it is more likely that at this stage a larger number of lower-value proposals (eg £30,000 to £80,000) will be funded than a smaller number of higher-value proposals.

Proposals should focus on a short, sharp, proof-of-concept phase – typically, but not exclusively, 4 to 6 months in duration - with at least one deliverable completed by 31 March 2015, and for longer programmes of work, a second deliverable completed at the end of the project. Proposals must include a descriptive scoping for a longer programme of any duration but the proposal should be clearly partitioned with a costed proof-of-concept stage which is the focus of this CDE competition. Proposals for further work beyond the proof-of-concept stage will only be considered after the proof-of-concept stage has delivered, using the understanding gained to make an informed decision.

Proposals must include:

- a clear statement of what challenge the solution is aimed towards
- a clear description of what is novel and innovative in the solution
- a clear statement of the programme of work that would be carried out and the outputs (deliverables) from the work
- a clear statement of the expected outcome(s), how this will be proven or demonstrated and how it will provide evidence that the outputs can be exploited

- a clear description of the value of the solution to operational capability including the likely saving to through-life costs
- a statement on the anticipated practicality of adopting the proposed solution
- an outline of any data/equipment requirements of the proposal, and how these will be met. Any dependencies on the supply of data/equipment from MOD must be stated.
- a description of how a successful outcome could be taken further into a second phase of work.

Proposals that do not include the required information are unlikely to be successful.

Proposals will be assessed by subject matter experts from MOD and Dstl and the US using the MOD [Performance Assessment Framework \(PAF\)](#). Deliverables from contracts will be made available to Technical Partners and subject to review by UK MOD.

## CDE proposal submission process

### Key dates

- 22 July 2014 Competition networking event in London
- 29 July 2014 Post-launch webinar
- 11 September 2014 Competition closes at 5pm
- 29 October 2014 Contract placement initiated and feedback provided
- 31 March 2015 Interim / final deliverable complete

**Proposals for funding must be submitted by 5pm on Thursday 11 September 2014 using the [CDE portal](#). Proposals must be clearly marked with 'Detection of airborne hazards (+ challenge 1, 2 or 3)' as a prefix in the title.**

Please plan the timeline for submitting your proposal carefully. If you have not used the CDE portal before you will need to become familiar with the guidance, including how to open an account starting with the [Quick Start Guide](#).

Other information and guides are available on the CDE website:

- general CDE advice: [www.science.mod.uk/engagement/cde/working\\_with\\_cde.aspx](http://www.science.mod.uk/engagement/cde/working_with_cde.aspx)
- contract & IPR guidance: [www.science.mod.uk/engagement/cde/funding\\_contracts.aspx](http://www.science.mod.uk/engagement/cde/funding_contracts.aspx)
- on using the portal: [www.science.mod.uk/engagement/the\\_portal.aspx](http://www.science.mod.uk/engagement/the_portal.aspx). The portal is optimised for proposals based on physical sciences and engineering and we are aware that proposers sometimes struggle to adapt to using it with social science based proposals. The key points (rather than the detailed questions) that are sought under the main headings still apply and further advice can be obtained from CDE.

Common errors in preparing and submitting a proposal include:

- **character limit** – there is a limit of 1000 characters in each individual descriptive paragraph within the proposal; when completed they must be added to the document; additional paragraphs can be added if 1000 characters is insufficient.
- **it is a web-based tool** – please save your work regularly to avoid 'time-outs' that lose work.
- **attachments fail** – They must be Word 97-2003 format, portrait format, should have generous margins with no material overhanging the margin and a max size of 1 MB. Please note that attachments should

only be used for supplementary information, the main points of your proposal should be written into the online form. Care should also be taken to make sure that attachments are placed in the relevant section (eg technical information should not be attached to the commercial section).

- **failing to properly submit - publish is not the same as submit.** You have **not** completed the submission process if your proposal is at the FINAL/PUBLISHED stage (in the status and published status columns respectively); CDE has no sight of the proposal at this stage. To complete submission you need to press 'submit' under the 'Tasks' column. This changes the status of your proposal to 'SUBMITTED'; it will then change (normally after a few days, often sooner) to 'RECEIVED' indicating that the proposal has been accepted by CDE for assessment.

For a proposal to be accepted for assessment:

- the standard terms and conditions of CDE must be unequivocally accepted
- there must be at least one deliverable against which payment can be made
- the commercial section of the proposal must be completed.

**Please do not leave submission of your proposal until just before the deadline.** Past experience has shown that the Portal becomes heavily loaded near the competition close resulting in slow operation (up to one hour to publish rather than a few minutes) and that, with the pressure of the deadline, mistakes are made that mean proposals are not submitted or accepted.

**All proposals and content placed on the portal must be UNCLASSIFIED.**

## Queries and help

As part of the proposal preparation process, queries and clarifications are welcomed:

- **Technical queries** about this specific competition should be sent to: [cbrcde@dstl.gov.uk](mailto:cbrcde@dstl.gov.uk) with 'Detection of airborne chemical hazards' in the email title.  
**Capacity to answer these queries is limited in terms of volume and scope. Queries should be limited to a few simple questions or if provided with a short (few paragraphs) description of your proposal, the technical team will provide, *without commitment or prejudice*, broad yes/no answers. This query facility is not to be used for extensive technical discussions, detailed review of proposals or supporting the iterative development of ideas. While all reasonable efforts will be made to answer queries, CDE and Dstl reserve the right to impose management controls when higher than average volumes of queries or resource demands restrict fair access to all potential proposal submitters.**
- **General queries** (including how to use the portal) should be sent directly to CDE at [cde@dstl.gov.uk](mailto:cde@dstl.gov.uk).

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