

# Centre for Defence **Enterprise**

*CDE proves the value of novel, high-risk, high-potential-benefit research. We work with the broadest possible range of science and technology providers, including academia and small companies, to develop cost-effective capability advantage for UK armed forces and national security.*

## Highly robust ground platforms



This CDE themed competition is looking for proposals that develop mechanisms for ground vehicles with enhanced robustness against impact and blast.

Specifically, we want to see improvement in robustness by demonstrating the ability of a small, remotely controlled vehicle to continue to function after experiencing a small explosive detonation. We want to identify mechanisms that are unlikely to suffer damage when exposed to blast or impact, or that are simple, quick and cheap to repair after damage.

This competition is for the Armour, Protection & Survivability Technology Centre.

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

[Competition networking event: Tuesday 13 January 2015 1 Westferry Circus, London](#)

**Competition close: Thursday 19 February 2015 at 5pm**

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# Highly robust ground platforms

## Background

The Ministry of Defence (MOD) has been successful in developing protective systems for ground vehicles that result in significantly enhanced survivability for the passengers. However, while the passengers may suffer little injury from a blast attack, the vehicle is badly damaged.

We want to improve the ability of ground vehicles to continue to function after attack to enhance mission survivability. If it's not possible to retain full capability, we'd like to see gradual degradation of performance (ie retain some capability), instead of complete failure. Alternatively, we'd like to see mechanisms that are simple, quick and cheap to repair or replace after damage.

We propose, at this stage, to develop a small (no more than 50kg), crewless vehicle by removing the passenger, as they are the most fragile component. There are many examples of highly capable and versatile remotely controlled ground vehicles, but they are often no more robust against blast or impact than a similar crewed platform.

We believe that it's possible to develop a much more robust, remotely controlled, sensor platform by designing it from scratch to be as robust as possible by using mechanisms that are inherently tough. For example, some mechanisms and engineering techniques are naturally more robust than others against explosion, eg small devices are generally more robust than larger ones, plain bearings tend to be more robust than ball races.

A sensor platform that can survive an explosive blast and retain functionality would be very useful. The identification of mechanisms and engineering principles that are intrinsically more robust against blast and impact would also be useful in several other applications.

## Technology challenges

### **Challenge 1: robust components**

MOD wants to identify and develop mechanical components that will enhance survivability for the sensor platform when subjected to blast from the ground. Many types of sensor or mechanism include items that are not naturally robust against blast and impact and the subsequent high-intensity stress waves that propagate through the structure. Additionally, many current systems require significant work to repair or replace components after blast damage, due to the complex damage sustained.

Specifically, we're interested in identifying and developing sensors and components that are inherently robust against blast and shock damage. We'd like to see proposals for the design or development of sensors or mechanisms that can be shown to be theoretically extremely robust against blast and shock, with full technical reasoning detailing why these items have improved robustness.

Required deliverables:

1. A report detailing the design methodology and the reasoning behind the design and technology of a sensor or mechanism to give optimum robustness.
2. A proof-of-concept component to be tested by the bidder against a relevant impact, shock or blast (to be identified within the proposal).
3. A report detailing the results of the testing, with analysis of any component failure.

## **Challenge 2: platform demonstrator**

We're looking for proof-of-concept research proposals for the development of a small, very basic, remote-controlled sensor platform with enhanced robustness against blast from a buried explosive device. We also want to identify system design factors that lead to enhanced survivability against blast.

We want proposals for the design and build of a proof-of-concept platform. Your platform must:

- move under remote control
- remotely control a camera
- transmit the image information from the camera to a base station
- be optimised against assault from a buried charge

Note that we are primarily concerned with the robustness of the platform. The camera is of secondary concern.

Required deliverables:

1. A report detailing the design methodology and the reasoning behind the choice of design and technology to give optimum survivability.
2. The proof-of-concept platform for testing (this will remain the property of the developer and will be returned after testing).
3. A report detailing the results of the testing, with analysis of any component failure.

Each proof-of-concept platform will be tested by the Defence Science and Technology Laboratory (Dstl) by being exposed, while active, to successively increasing buried charge detonation, starting from a low net explosive quantity. Survivability will be assessed by the retention of functionality through the blast trial. It's expected (but not compulsory) that bidders will attend the testing of their platform. The testing is expected to take less than one day per platform. Numbers of attendees will be limited due to administrative requirements.

### **What we want**

We're looking for proposals for the components or platform demonstrators of a small, simple, crewless, remote-controlled sensor platform to demonstrate intrinsically robust mechanisms to maintain functionality through a blast event.

**Your proposal should be for a vehicle of no more than 50kg.**

We're looking for innovative approaches to enhancing robustness or the novel use of techniques or technologies from other applications that could provide a solution to our challenges.

To improve the likelihood of exploitation, we encourage proposals from partnerships between industry and academia.

### **What we don't want**

We won't fund developments of algorithms for autonomy, artificial intelligence or control.

### **Exploitation**

We expect the output from this competition will be a number of proof-of-concept, high survivability, crewless sensor platforms or components, optimised for the retention of capability after exposure to a mine blast. We plan to develop either the most successful of these, or an amalgamation of the best principles and features from all of them, into a very high survivability platform. Up to £500,000 will be available for this second phase. We

hope this will be exploited in sales for defence or for other sectors demanding high robustness and immunity to shock and impact. If a product resulting from this programme is commercially attractive, discussions with potential industrial primes could take place to identify interested partners for exploitation. Please read the information in the '[Invitation for CDE proposals](#)' section of this document carefully to understand how to partition your work and what to include in your proposal document.

### **Important information**

Proposals for funding must be submitted by **5pm on 19 February 2015** using [the Centre for Defence Enterprise portal](#). Please mark all proposals for this themed competition with '**Highly robust ground platforms (+ challenge 1 or 2)**' as a prefix in the title. See '[Technology challenges](#)' section above for a description of the challenges under this competition.

**Technical queries** should be sent to [aandpstcenquiries@dstl.gov.uk](mailto:aandpstcenquiries@dstl.gov.uk). Please see guidance 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).

## **Invitation for CDE proposals**

***This competition will be supported by presentations given at the launch event on 13 January 2015.***

***These will be available to view via:***

**<https://www.gov.uk/government/publications/cde-themed-competition-highly-robust-ground-platform>.**

Proposals are invited from industry and academia in the UK and overseas for research that can demonstrate a proof-of-concept to meet one or more of the challenges for the highly robust ground platforms competition.

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 £20,000 to £80,000) will be funded than a small number of higher value proposals.

Proposals should focus on a short, sharp, proof-of-concept phase – typically, but not exclusively, 3 to 9 months in duration - with deliverables completed for delivery for testing by January 2016. Proposals should 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

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

[Read further information on what all proposals must include on our website.](#)

Proposals will be assessed by subject matter experts from MOD and Dstl using the MOD [Performance Assessment Framework \(PAF\)](#). Deliverables from contracts will be made available to Technical Partners and subject to review by UK MOD. We may also share results with other UK government departments.

Dstl will be available to provide advice and/or guidance via an appointed Technical Partner throughout the project and provide the interface with MOD and wider government stakeholder community.

Dstl doesn't commit to fund any follow-on work as a result of any contracts placed via this CDE competition, but more promising ideas will be considered for further funding where appropriate.

## CDE proposal submission process

### Key dates

- 13 January 2015 [Competition launch event at 1, Westferry Circus, London](#)
- 26 January 2015 [Webinar](#)
- **19 February 2015** **Competition closes at 5pm**
- Mid April 2015 Contract placement initiated and feedback provided
- By January 2016 Proof-of-concept research complete

Proposals for funding must be submitted **by 5pm on 19 February 2015** [using the CDE portal](#). Proposals must be clearly marked with **'Highly robust ground platforms (+ challenge 1 or 2)'** as a prefix in the title.

## 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 [aandpstcenquiries@dstl.gov.uk](mailto:aandpstcenquiries@dstl.gov.uk)

**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. Whilst 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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