



Next Generation Nuclear Material Detection

Call for Research Proposals on novel approaches to provide a rapid, compact and integrated approach to provide a nuclear material detection capability.

*Call Release Date: 1st December 2010
Call Closes: 11th January 2011 (at 1200 noon)*

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Proposals for funding should be submitted by **1200 (noon) on the 11th January 2011** using the Centre for Defence Enterprise Portal (www.science.mod.uk/enterprise). All proposals should be clearly marked "**Nuclear Material Detection**" as a prefix in the title.

- Queries relating to the **technical aspects** of the call should be addressed to enquiries@ctcentre.gov.uk and clearly marked Next Gen NMD.
- All questions relating to the **submission process** (including how to use the CDE Portal) should be addressed directly to the CDE at science-enterprise@mod.uk or by phone on 01235 438445.

www.science.mod.uk/enterprise
www.dstl.gov.uk

SBRI Government challenges.
Ideas from business.
Innovative solutions.

Next Generation Nuclear Material Detection

Context

This call for proposals is seeking to identify and develop the next generation of nuclear material detection technology for MOD. The solutions should aim to provide a rapid, compact and integrated approach to provide a nuclear material detection capability.

When generating ideas a wide range of operational environments should be considered, for example, the detection of nuclear material within containers, vehicles and/or buildings. MOD is looking for ideas that are innovative, will provide future technology solutions to a working concept / prototype solution and can (ideally) be developed to Technology Readiness Level (TRL)¹ 6 within a 6 to -24 month timeframe.

The solutions should focus on systems that have potential to be mounted on remote vehicles (similar to bomb disposal robots currently in service) or used by a dismounted user (i.e. on foot – not mounted in a vehicle). Ideas should not include the development of potential delivery platform (eg. a robot) but should consider a systems approach and key parameters for integrating the solution onto the platform.

Specifically within this CDE call there are several key operational enhancements where ideas are sought to improve nuclear material detection:

- a) New techniques or technologies which can be used to detect nuclear material.
- b) Novel applications of existing techniques or technologies which, with limited development, could be applied to nuclear detection.
- c) Enhancements to current science and technology which will significantly improve detection.

It is recognised that enhancing nuclear material detection capabilities is technically challenging and as a result, a combination of technologies may be required to achieve the optimum probability of detection against the probability of false alarms.

Consideration should be given to the solution space defined by the mass (amount) of nuclear materials which could be detected, the stand-off distance between the point of detection and the material and the amount of shielding through which material could be detected.

Of particular interest would be solutions which could provide rapid, accurate and reliable detection of kg or sub kg masses of nuclear materials through dense shielding material (hundreds of gcm⁻² areal masses) at a stand-off distance of many (tens) metres.

¹ For information on TRLs please see http://www.aof.mod.uk/aofcontent/tactical/techman/content/trl_whatarethey.htm

Key Performance Characteristics

To enable effective assessment of proposals a number of key performance characteristics of your idea needs to be included:

1. Sensitivity
 - a. What quantity of material detected against detection stand off distance achieved.
 - b. The impact on performance caused by thickness of shielding.
 - c. Which materials can be detected.
 - d. What data will be generated.
 - e. What is the anticipated limit of detection.
2. Time
 - a. What is the minimum predicted measurement time to achieve the predicted probability of detection against the probability of false alarm.
3. False Alarms
 - a. The likelihood of the sensor to give false negatives.
 - b. Are any materials likely to cause false positives.
 - c. How will the equipment deal with innocent alarms.
4. Operation
 - a. What is the high level concept of deployment of the technique or technology.
 - b. What skill level will be necessary to operate the equipment.
 - c. What hazards would be present to the operators and / or the general public.
 - d. How will the equipment be powered.
 - e. What will be the duration of powered operation.
 - f. What consumables or regular maintenance will be required.
5. Size
 - a. What are the dimensions of the equipment.
 - b. What is the mass of the equipment.
6. Cost
 - a. The likely cost per unit of the final product.

The scope of this call is deliberately broad to encourage the generation of novel ideas. Solutions at a range of Technology Readiness Levels (TRL's) will be considered but priority will be given to those considered to have the potential to reach TRL 6 within a 6-24 month timeframe.

Getting Involved

Proposals for “Next Generation Nuclear Material” are invited from across industry and academia using the CDE submission process.

The call is for innovative solutions to the technical challenges detailed above which would enhance capability across a range of scenarios. The information provided is intended to stimulate thought and should not be considered as a full statement of requirement, or a rigid constraint on a proposed solution.

It is important for suppliers to understand that the ‘Next Generation Nuclear Material Detection’ call is focussed on looking at high risk, quick win solutions and suppliers are urged to submit their best ideas, regardless of how unusual or outrageous they may at first appear.

Submission Process

All proposals in response to this call must be submitted via the CDE Portal (www.science.mod.uk/engagement/the_portal.aspx).

All proposals should be based on a 90 day phase 1 with a proof of principle decision point after 90 days. Phase 1 of the proposal should outline how the idea will be initially developed to demonstrate that the idea or concept is feasible for rapid development into a working concept or prototype within 24 months. At the 90 day break point a review of the work will be undertaken to decide on continuing to the next phase (phase 2). All phases (1 and 2) should be completed within 6–24 months. Proposals should include indicative costs for phase 2.

It is more likely that at the phase 1 stage, a larger number of lower value proposals (typically £20k—80k) will be funded than a small number of higher value proposals, however projects with funding outside these constraints will also be considered.

It is expected that the end of the project (6-24 months) that a working concept / prototype solution will be demonstrated.

For this call we are not accepting part funded or seedcorn funded proposals. Terms and conditions of the contract will for this call be based around a fully MOD funded contract using DefCon 705 to manage Intellectual Property. Full details are available on the CDE website pages.

Assessment of the proposals will be conducted using the MOD PAF (Performance Assessment Framework) that is available as a download from the “Working with CDE”

section of the CDE website (www.science.mod.uk/enterprise). Proposals must include a clear description of what is novel in the proposed solution and the value of the solution to operational capability.

Please note that assessment of proposals will be conducted by an expert panel which will include representation from Atomic Weapons Establishment (AWE)². AWE are involved in this call through their status as UK Subject Matter Experts for nuclear materials. Their involvement in this call is covered by a strict a non-disclosure agreement (NDA) to protect your ideas. Any contracts resulting from a result of this call will be solely with the MOD.

This call for industry and academia to submit proposals will close at 1200 (noon) on 8th February 2011 using the Centre for Defence Enterprise web portal and clearly marked Nuclear Material Detection.

Please plan the timeline for submitting your proposal carefully. If you have not used the CDE Portal before you will need to open an account and become familiar with the guidance, starting with the Quick Start Guide (Version 2.1) [see www.science.mod.uk/engagement/the_portal.aspx], before initiating your proposal. The manuals and guides are available on the website.

Please do not leave submission of your proposal to the last minute, past experience has shown that the Portal becomes heavily loaded near the call close date and that this can result in slow and difficult operation.

Queries relating to the technical aspects of the programme should be sent to enquiries@ctcentre.gov.uk clearly marked Next Gen NMD.

All questions relating to the submissions process should be addressed directly to the CDE at science-enterprise@mod.uk or by phone 01235 438445.

Key Dates

- 8th December 2010 CDE call document released
- 8th February 2011 Call closes at 1200 noon
- 22nd February 2011 Target for completion of the technical review of proposals
- 22nd February 2011 Target for Decision Conference on submitted proposals

² AWE is managed for the Ministry of Defence (MOD) through a contractor-operated arrangement. While AWE sites and facilities remain in government ownership, the management, day-to-day operations and the maintenance of Britain's nuclear stockpile is contracted to a private company: AWE Management Limited (AWE ML). See www.awe.co.uk for further information.