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.

Defence medical sciences

This CDE themed competition aims to identify new and innovative science and technology to enhance the level of medical care that the Ministry of Defence (MOD) provides to its deployed armed forces.

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

Competition networking event: Tuesday 30 September 2014 in Scotland at 200,St Vincent Street, Glasgow

Competition close: 13 November 2014 at 5pm

CDE: www.gov.uk/dstl/cde
Dstl: www.gov.uk/dstl

SBRI Government challenges. Ideas from business. Innovative solutions.

[dstl]

Defence Science and Technology Laboratory

Ministry of Defence

Defence medical sciences

Background

Modern equipment makes a significant contribution to military capability, but the human component remains absolutely central. Operational success requires sufficient, capable, motivated and appropriately trained personnel working within systems that have been designed with them in mind. Protecting and rehabilitating these personnel is vital for sustaining this capability and addressing MOD's responsibility for longer term care.

Crucial to the success of military operations is the provision of high-quality medical support and systems which enhance the level of medical care provided to service personnel. The extreme demands of the battlefield require MOD to have access to systems that can be deployed in extreme environments to provide medical treatments, interventions and support to injured personnel.

It is difficult to predict the timing, location, scale and duration of future military operations, however, as the UK MOD moves to contingency operations post-Afghanistan, defence medicine will face a number of unique challenges, two of which MOD wishes to address within this competition.

Technology challenges

This CDE themed competition is seeking new solutions and technologies to develop opportunities to intervene and dispense care on the battlefield.

By addressing unique military needs, or by translating civilian medical systems into the military environment, proposals are invited against two specific challenges outlined below, together with the considerations and priorities that have been defined below. Proposals must address at least one of the challenges, but could address both.

Challenge 1 – technologies for health surveillance

Understanding and analysis of "Medical Big Data" is revealing opportunities to intervene and apply corrective actions at an earlier stage within patient care. Analyses are also beginning to identify the likelihood of injury, infection or disease within populations and individuals.This ability provides an opportunity for MOD to shape future medical care provision and capability. Additionally, advances in diagnostic capabilities, data acquisition and data management can be used to generate an evidence base that supports medical intervention to protect, improve and restore performance and ability on military operations. This challenge is seeking new technologies to exploit physiology and biochemical pathways to deliver novel parameters of health and well-being. This will be to predict injury, infection or disease in a military population at risk, with the aim of developing opportunities for corrective action.

Proposals are requested to address this challenge to develop or enhance technologies or systems for health surveillance within a military context, which may include, but are not limited to the following:

- **novel methods for data recording and management**

  This may include automated mapping of wound and injury patterns, development of measures/ classification of injury and injury mechanisms or novel methods for data collection. All proposals and solutions should consider patient data protection and development of standards and governance

- **utilisation of biomarkers**

  This may include markers of injury potentials and opportunities to develop or target treatment options

- **data integration and decision support**

  Solutions may include integration of machine data (e.g. sensors, meters, vital signs monitors), biometric data (e.g. biomarkers, DNA, x-rays, BP, pulse-oximetry) and human generated data (e.g. doctors'/surgeons' notes) or integration of patient data relating to, for example, bleeding, pain, tissue viability, hydration, nutrition, infection and treatments. Management of an individual patient's data is also of interest, in particular in moving from front line through to hospital care in the UK. The linking of medical data to environmental, occupational and operational data (and patient's fitness records) will also be considered. Finally, proposals that consider the development of predictive capabilities, including early predictors of acute or chronic injury or illness, data trend analysis and decision support tools are also welcomed

- **novel materials and capabilities**

  This may incorporate new materials for data collection, including, for instance, sensors embedded within clothing or dressings

Challenge 2 - advanced medical systems for field care

Military personnel face unique threats and hazards on operations; medical environments are unpredictable, and the severity and type of injuries are often very different to those found in civilian environments. This means that many products and systems from civilian healthcare are not easily translatable.

Future military operations may require service personnel, including medical specialists, to operate in harsh (hot, cold, tropical, high altitude) environments, with extended waiting times for treatment and evacuation to a field hospital. As UK MOD moves to contingent operations, post-Afghanistan, operational medicine will evolve and contingent medical capability will rely on smart, innovative, less logistically intense means of diagnosing (for example, via imaging and point of care laboratory testing) and treating medical emergencies.

Within this challenge, MOD is seeking to identify and demonstrate innovative technology solutions for routine application by non-specialists in an operational setting, to diagnose the cause and severity of injury or illness and assist in delivering care. Innovative systems are also required, that will promote positive outcomes to those injured in battle or to protect patient and carer safety.

Proposals are requested to address this challenge, which may include, but are not limited to the following:

- **novel diagnostics**

  Proposals may include multi-functional diagnostic capabilities, differential diagnostic and treatment capabilities or self-diagnosis capabilities (including options to reachback to treatment or intervention options)

- **patient care and management**

  Proposals may include enhancements to blood product screening and safety, development of novel drug delivery systems or oxygen monitoring and delivery

- **opportunities to maintain force effectiveness**

  Opportunities to modify and enhance current clothing or personal equipment to deliver added benefit, for example, in stimulating performance or enhancing recovery from injury and/or disease. This could

incorporate ideas such as impregnation of clothing with antiseptics and antibiotics, providing potential early intervention to burns and blast casualties

Defence medical sciences requirements

Systems, techniques and products must be capable of use and integration within current military medical operations and provide benefit to the user, patient and Defence. They should take into account the environment in which they will be used and the training burden associated with use. Solutions should demonstrate potential cost and/or time saving benefits and identify how solutions may be validated or accredited and linked, where appropriate, to relevant standards.

The doctrine for delivery of medicine across the UK Armed Forces is found within Surgeon General's Joint Medical Doctrine (3rd Edition), JDP 4-03[1].

Although at this proof of concept stage it is not necessary to have fully robust and complete solutions, it should be clear how the proposals could be credibly developed for use either against exacting standards required for medical practice or in harsh front line environments, and minimising the burden associated with their training, support and use.

Further information, covering Defence Medicine and the Front Line Commands, can be found via the websites of the following:

- Defence Medical Services (https://www.gov.uk/defence-medical-services)
- Army Medical Services (http://www.army.mod.uk/medical-services/30005.aspx)
- Royal Navy Medical Services (http://www.royalnavy.mod.uk/The-Fleet/Medics-and-Chaplains/Medical-Services)
- Royal Air Force Medical Services (http://raf.mod.uk/organisation/rafms.cfm)

What we want

It is vitally important to demonstrate within proposals that the effort and expense of tailoring conventional medical systems to bespoke defence challenges is justified by a real benefit. Proposals are sought for both challenges that will demonstrate or de-risk the exploitation of technologies to provide solutions to the outlined challenge. This includes concepts or practical demonstration (components or sub-systems as well as complete systems), supported by scientific understanding and analysis. Proposals should be clear on their applicability to military medical procedures and the potential benefit that they could provide.

Specifically we are looking for:

- systems which consider potential costs to MOD of introduction, with due regard to their effectiveness, ethics and medical standards
- systems that can be integrated into existing MOD platforms such as field ambulances
- potential solutions which can be updated or upgraded easily in future
- systems which can be validated against standards and cross-referenced to current models
- systems which require minimal training or changes to existing practice
- demonstration of proof-of-concept for further investigation

[1] JDP 4-03 is available at https://www.gov.uk/government/publications/jdp-4-03-joint-medical-doctrine

What we don't want

- proposals requiring an unrealistic burden, e.g. in training or significant changes to doctrinal structures
- management or provision of data handling services
- consultancy on data management
- existing 'off the shelf' products

Exploitation

Successfully funded projects, with the assistance of Dstl/MOD Technical Partners, may be integrated into MOD's Medical Sciences Research programme, linking the following research themes:

- casualty care
- contingent operational medicine
- whole service life care
- medical systems

There are additional linkages to MOD's Training & Education research programme.

Projects demonstrating utility to MOD may enter the relevant part of MOD's procurement process, either to further refine, trial or purchase, with a concurrent review of policy, doctrine and training requirements.

It is anticipated that successful bidders will be invited to future MOD Human Capabilities and/or Medical Sciences Stakeholder Showcase events, where members of MOD's wider user community will be able to view and assess benefits arising from the project and provide/highlight future exploitation paths.

Important information

Proposals for funding must be submitted **by 5pm on 13 November 2014** using the CDE portal.
Please mark all proposals for this themed competition with **'Defence medical sciences'** as a prefix in the title.
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.

Ethical Considerations

All research involving human participation conducted or sponsored by MOD is subject to ethical review under MOD procedures, irrespective of any separate ethical procedures (e.g. from universities or other organisations). This ensures that acceptable ethical standards are met, upheld and recorded, and advocates adherence to national and internationally accepted principles and guidance. As a result, some of the proposals may require full ethical approval, involving existing MOD processes and procedures. The following definitions explain the areas of research that require approval:

Clinical
Conducting research upon a human participant, including (but not limited to) administering substances, taking blood or urine samples, removing biological tissue, radiological investigations, or obtaining responses to an imposed stress or experimental situation.

Non-Clinical
Conducting research to collect data on an identifiable individual's behaviour, either directly or indirectly (such as by questionnaire or observation).

All proposals should declare if there are potential ethical issues in the detail of the proposal.
Should you believe that your proposal may require ethics approval, please ensure that a phased approach is adopted within your submission as follows:

Milestone 1: Gaining ethics approval for the project, including delivery of the research protocols. The protocol will need to be detailed by completing the ethics application form found on the MOD Research Ethics Committee (MODREC) web site shown below. A break point should be included after Milestone 1.

Milestone 2: Proposed research that will be carried out subject to gaining ethics approval. Optional phases to be formally invoked, where appropriate.

For more information please go to https://www.gov.uk/government/groups/ministry-of-defence-research-ethics-committees

NOTE: The requirement for ethical approval is not a barrier to funding; proposals are assessed on the basis of technical merit and potential for exploitation. Successful bids will be supported through the ethical review process, however, an outline of the research methods in the bid are encouraged to aid this process.

Technical queries should be sent to **medicalsciences@dstl.gov.uk**

General queries (including how to use the portal) should be sent **cde@dstl.gov.uk**

Invitation for CDE proposals

This competition will be supported by presentations given at the launch seminar on 30 September 2014. These will be available to download via the 'Defence medical sciences' competition page.

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 (ie up to £100,000) will be funded than a small number of higher value proposals.
Read important information on what all proposals must include on our website.

CDE proposal submission process

Key dates

- 30 September 2014 Competition launch event at *200, St Vincent Street, Glasgow*
- 13 October 2014 Post-launch webinar
- 13 November 2014 Competition closes at 5pm
- 17 December 2014 Contract placement initiated and feedback provided
- 30 June 2015 Proof-of-concept research complete

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 **medicalsciences@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**