Market exploration: remote handling and manipulation

Summary

Moving house can be a stressful time, and there's extra pressure when you have to pack your boxes and make sure your valuable items are packed, stored and transported safely to your new home, with no breakages. Now imagine doing all of those steps remotely, and with something which needs even more care.

The UK government has a requirement to pack, lift and transport sensitive hazardous materials from one location to another, for analysis. In this Market Exploration, we are looking for technology that can help do that remotely and your participation could be critical in supporting national security

To aid UK Government in scoping potential follow on activities, we are engaging the market in order to gain an understanding of whether this capability can be realised by:

- adapting technologies from other market sectors
- adapting capabilities already in development
- using one system or a system of systems
- developing novel innovations

This market exploration is not a commitment to subsequently launch a formal DASA competition. It is anticipated there will be a significant delay between this market exploration and any potential follow on activities to allow for a statement of requirements to be developed.

Background

The UK Government has a requirement to protect UK citizens and infrastructure against the threat from explosives.

The hazards of highly sensitive explosives and the associated health and safety concerns mean that manual handling of significant masses is undesirable. Therefore, a remote handling and manipulation capability is essential for the UK to allow the required work with sensitive explosives to be safely undertaken. In this way, the UK Government can drive the improved characterisation of these explosives and improvised explosive devices (IEDs), the development of and the improvement of security screening equipment, and develop the required training, evaluation and certification tests and standards.

The remote handling capability, referred to hereafter as 'the solution' is required to enable the safe transport and manipulation of explosives between various storage, test and disposal locations within an existing UK Government

facility.

Solution Requirements

We are seeking a solution that can operate remotely and perform an array of complex tasks where precision and reliability are key. This solution could be met by one system, or it may be comprised of a number of individual systems to meet all requirements – a system of systems.

The solution must operate out of direct-sight of the operator but giving the operator a view of all processes in order for them to perform the remote control. The solution must lift, move and manipulate containers between various locations within a UK Government facility. It must be compatible with a variety of containers and weights, and be able to safely transfer explosives between various primary and secondary containers, as well as being able to lift and transfer containers to and from stands and equipment up to a height of 3m. Solutions must not cause appreciable stimuli to the explosive from impact, friction, temperature or electrostatic discharge.

The solution must be able to move and fit components to the outside of containers to enable blast trials or disposal. If required, the solution must be able to abort and make safe all processes, and be able to recover any explosive filled containers and return them to the storage or disposal location.

The solution must be able to move and manipulate masses of explosive of between 0.01-5 kg within a container/multiple containers of a total mass of 0.1-15kg.

Sub Requirements

It is anticipated that more than one system may be required to meet all requirements, and in your submission we ask that you outline which requirements your solution can/could deliver. You do not have to address all sub requirements to respond.

Below is a summary of each sub requirement; for more detailed information please see the 'Remote Material Handling and Manipulation – Detailed Requirements' Remote Material Handling and Manipulation – Detailed Requirements (PDF, 813KB, 11 pages) .

1. Transfer of explosive to primary container and preparation of primary container

Explosives must be transferred from one container (the container in which they have been manufactured) to another (the primary container). Liquid explosives can be poured, but solid explosives (powders and slurries) are likely to be more difficult to transfer; they will have a range of water contents and a range of viscosities, and some may stick or form lumps. Rotation of the container (to mix the explosive) and tamping of solids within the container (to create a range of densities) are required. Containers must

be opened and sealed via different mechanisms and instrumentation must be able to be attached to the outside of containers.

Time is of the essence and transfer of material must be achieved before any changes to the material occur; timescales of less than 1 hour are required.

2. Placement of primary containers within secondary containers

The primary containers are to be placed within a range of different secondary containers such as bags, suitcases and boxes. Whilst not essential, we are also interested in the ability to place primary containers within shoes, laptops, other electrical items/ domestic items and pipes, and onto mannequins. The solution must be able to close/seal the secondary container and reverse the process.

3. Transport of primary/secondary containers between different locations

Solutions must be able to operate outside in most weather conditions (excluding extremes of weather), lift and transport containers on unperfected road surfaces over several hundreds of metres without line-of-sight between some locations and be able to travel up an incline (approximately a 7m rise over 100m). Containers must be able to be transferred between different locations and placed onto the ground or onto platforms/equipment at heights of up to 3m, and be placed with an accuracy of approximately 1cm. Solutions must be able to place containers within a storage unit, seal and lock the unit and perform this in reverse.

4. Load/retrieve containers from X-ray/CT scanner(s)/other detection equipment

For this requirement the solution only needs to operate indoors, in an area 25 x 15m. The solution is required to provide a conveyor belt mechanism to pass primary/secondary containers through a number of X-ray scanners (and other detection equipment) in turn, repeating passes through the scanners in different orientations. The containers must be able to be centred on the belt and their orientation changed; they must be prevented from being scanned together, to become jammed inside scanners, or to fall from the belt.

After the containers have been scanned, they are to be transferred to a ‘loading station’. The secondary container is to be opened, the primary container removed and placed into another secondary container which is closed/sealed and returned to be conveyor belt to be scanned.

There must be a throughput of a minimum of 20 containers in a seven hour working day, and it is desirable to achieve 200 containers. If the scanner cannot be remotely controlled to start scanning, or if remote functionality is lost, the solution must be able to press a button/turn a key to start scanning.

5. Emergency abort, retrieval and make safe all processes

The solution must be able to stop and make safe all remote operations at any point and be able to return any explosive filled containers to the storage or disposal location. It is also desirable that the solution is able to fix and restart any failed processes should it be safe to do so.

What we don't want:

- we are not interested in solutions which enable the remote manufacture of explosives
- we are not interested in receiving ideas for literature reviews or paper-based studies

This is not a competition and therefore we are not asking for costed proposals at this stage. However, we have asked for your estimated cost range to inform future activities. This is a market exploration exercise and we do not commit to subsequently launch a formal DASA competition.

How to submit a market exploration Capability Submission

Responses to this market exploration must be submitted via the DASA submission service, for which you will be required to register.

There are four questions relating to your capability, where we are seeking to understand what and how much further development is required for a complete solution to all requirements, or whether a combination of separate solutions is required. The information you provide will assist in developing a statement of requirements for potential future activities. You will not be held to deliver to any of the timescales or cost estimates that you may give.

Submissions must be submitted by midday on 4 December 2019.

Please only provide details of one product/capability per form. If you have a number of potential solutions, then please submit multiple forms. If you have any questions, then please email accelerator@dstl.gov.uk with 'Remote Material Handling and Manipulation' in the subject line.

How we use your information

Information you provide to us in a Capability Submission, that is not already available to us from other sources, will be handled in-confidence. By submitting a Capability Submission Form you are giving us permission to keep and use the information for our internal purposes, and to provide the information onwards, in-confidence, within UK Government. The Defence and Security Accelerator will not use or disclose the information for any other purpose, without first requesting permission to do so.