



MESSAGE FROM THE CHIEF DEFENCE SCIENTIST

The \$730 million Next Generation Technologies Fund is an exciting and bold program, focused on delivering game-changing capabilities for Australia's Defence Force.

To deliver on this 10 year forward-looking program, Defence is partnering with industry and academia through a range of small, medium and large-scale initiatives that will drive innovation and meet the technology challenges of the future.

The Grand Challenges program is one of the primary initiatives. A grand challenge is a highly complex and seemingly intractable problem which requires new ideas and technologies for a solution based on multi-disciplinary research and wide-ranging collaboration.

For example, the US Government's Defense Advanced Research Project Agency, or DARPA, supported a consortium of universities and research firms to build a network of computers able to exchange information. This led to the internet and the World Wide Web.

The first Grand Challenge is to counter improvised threats, recognising that these threats constantly evolve and endanger the lives of our troops and civilian populations.

We welcome proposals from the innovation community for solutions to this Grand Challenge and look forward to working together on delivering successful outcomes for Defence's future capability.

Dr Alex Zelinsky
Chief Defence Scientist

INNOVATION PORTAL

The Department of Defence welcomes your innovative ideas, no matter how big or small. If you work for a university, research agency, multinational, have your own business, belong to a think-tank, or anything in between, Defence wants to hear from you. The portal website is home to Defence innovation priorities and helpful documents like our new intellectual property strategy and contracting framework. It's also where you can submit your innovation proposals to our two signature innovation programs – The Next Generation Technologies Fund and the Defence Innovation Hub.



MESSAGE FROM THE TASK FORCE

Since 2006, deployed elements of the Australian Defence Force (ADF) and other Australian Government agencies, have faced the pervasive and continually evolving threat posed by Improvised Explosive Devices that has such horrific consequences that affect military, law enforcement and primarily the innocent civilian population. It also undermines the stability of affected nations and so is a terrible weapon system. This threat has not only proliferated globally but has also expanded to include the improvised use of dual-use delivery platforms such as unmanned aerial vehicles, dual-use explosive and incendiary materials and components, and the improvised use of chemical, biological and radiological materials and agents.

It is expected that these improvised threats will feature in the complex, contested and congested battle-space likely to be encountered by ADF elements in the future. They are also likely to be employed in the future by adversarial elements comprising both state and non-state actor groups, as well as terrorist/criminal networks and individuals.

Given the seriousness and pervasive nature of this current and future threat to Defence and the broader Australian community, I therefore welcome the critical role to be played by this Grand Challenge initiative in developing potential solutions to this appalling threat.

BRIG John Shanahan
Commander Joint Counter Improvised Threat Task Force

GRAND CHALLENGES PROGRAM LEAD

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Australian Government



DEFENCE INDUSTRY & INNOVATION

NEXT GENERATION TECHNOLOGIES FUND



GRAND CHALLENGES

Counter Improvised Threats

The Grand Challenges program is one of the first and largest initiatives under the Next Generation Technologies Fund, managed by the Defence Science and Technology (DST) Group. This program is designed to address tough Defence problems which can only be solved through innovative approaches requiring cross-disciplinary research across institutional and national boundaries.

The program will engage broadly and connect with the best from academic institutions, publicly funded research agencies and the defence industry. The ability to counter improvised threats without casualties is the first Grand Challenge identified as requiring urgent attention. One of the biggest security challenges facing Australia comes from improvised threats, which have claimed the lives of Defence personnel on operations and continue to threaten the safety of the broader Australian community.

These threats are not confined to the familiar Improvised Explosive Devices (IED) but could potentially come in many forms including on land, from the air or sea, with enhancements such as chemical, biological and nuclear hazards. They could also be delivered in increasingly sophisticated ways that make them more effective, more difficult to detect and more difficult to counter.

SCENARIOS

Two scenarios are provided to illustrate the context for Defence. The first concerns a Navy ship in a civilian port where a festival is taking place. The second concerns Defence capability in a war zone.



SCENARIO ONE – CIVILIAN ENVIRONMENT

A Navy ship is visiting a civilian port and has docked alongside the wharf. Improvised threats to the ship may be encountered while the ship is offshore or while it is approaching the harbour. An event is being held in the port area which is heavily populated with people, cars, media and buildings. The port is temporarily secured so access to the ship and wharf is restricted.

There is a requirement to ensure the safety of the ship and its crew along with the people attending the event and living in the area. There is a need to detect and respond to a number of potential threats in and around the wharf and throughout the community. The responses should not be harmful to the people. For example, detection systems incorporating non eye-safe lasers could not be used. Likewise, the use of explosives or radiation-based response systems may not be acceptable. Responding to threats should not interfere with civilian communications systems, for example RF interference should be minimised.

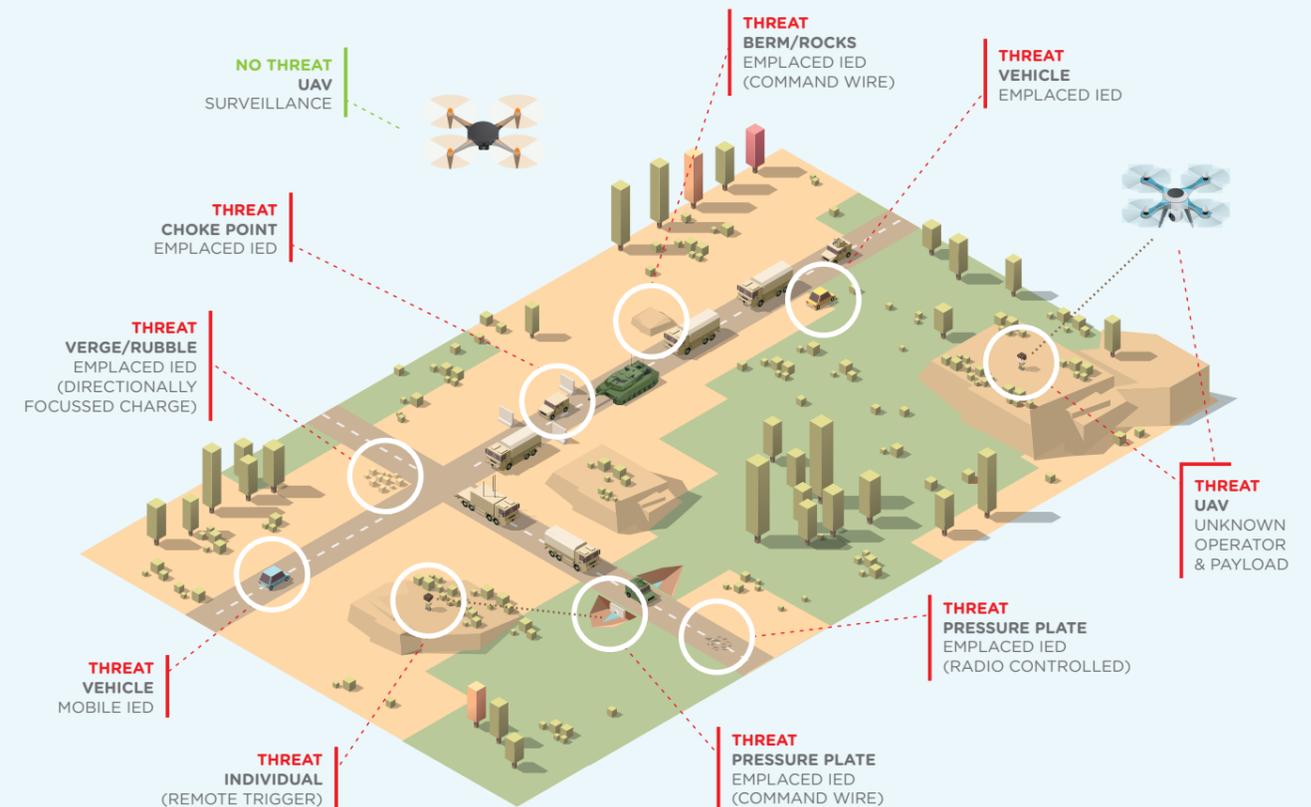
WHAT THE PROPOSAL MUST ADDRESS

The goal of the Counter Improvised Threats Grand Challenge is to demonstrate integrated detection and neutralisation systems, with minimal risk to Defence personnel or civilians, within three years. As threats evolve, it is expected that continuous innovation will be required to further develop new, additional integrated solutions.

The systems should be able to detect improvised threats with high confidence and specificity and subsequently cue appropriate responses to an operator located beyond the range of the improvised threat.

A premise of the approach is that no single sensor will be able to unambiguously detect all improvised threats in all possible scenarios. It is expected the research and development will lead to the creation of new sensors, in combination with the application and fusion of existing sensors to form integrated solutions which not only improve threat identification but also provide relevant response options, resulting in technologies for safely neutralising those threats.

It is critically important that the Australian innovation community works together to achieve this ambitious but achievable goal. Proposals are sought for funding for up to 3 years duration. Each project is expected to be funded in the range \$100,000 to \$1,000,000 per year depending on scale, complexity and risk. Proposals should include an in-kind contribution from the participant. Collaboration with DST is encouraged, but is not a prerequisite for applications.



SCENARIO TWO – WARFIGHTING ENVIRONMENT

In scenario two, Defence is operating in a foreign country, against an adversary that is employing guerrilla tactics and conducting irregular warfare. The operation is being conducted in unsecured territory. The adversary is likely to be difficult to identify and employing improvised threats to attack the patrol.

Defence personnel need to move from a safe area such as a military base to undertake operations either in communities or by transiting to another military base. This includes movement on foot through open country and in vehicles using tracks, roads, dry creek beds and open country. The adversary may employ a variety of improvised threat devices containing explosives, chemicals or biological agents. These devices may be buried or hidden on the surface, or carried in vehicles, either manned or unmanned.