



Australian Government

Defence

National Intelligence and Security Discovery Research Grants Program Round 3 (for funding commencing 2023): National Security Challenges

Pre-amble:

Science and technology plays a crucial and at times, dichotomous role in both strengthening and threatening a prosperous, secure and cohesive Australia. Australia's national security agencies, including those within the Defence and Home Affairs portfolios, operate within increasingly complex and rapidly shifting environments driven by multiple threat and opportunity vectors, including science and technology. Outcomes from our collective strategic outlook and scenario forecasting for the future out to 2040, including the Defence Strategic Update (DSU), signal that we are entering an era of significant change, unprecedented in scale and pace – both geo-strategically and technologically. In order to enable rapid responses to these challenges, we need to ensure that our national security capabilities are supported by science and technology that enhances strategic advantage.

The National Security Science and Technology Centre coordinates whole-of-Government science and technology for national security in order to support Australia's economic prosperity, national security and social cohesion.

Below are research topics focused on science and technology challenges for national security. The target time horizon is 2040. Proposals are invited that will significantly advance the sciences pertaining to these challenge topics. We are seeking research with game-changing potential.

Science and Technology Challenges

1. PREPAREDNESS, PROTECTION, PREVENTION AND INCIDENT RESPONSE CHALLENGES

The ability to appropriately equip and prepare Australian agencies to effectively address national security threats and natural or man-made destructive events, including mass-harm and mass-damage incidents, either by preventing their occurrence, or responding and recovering effectively if they have occurred.

Reliable Detection and Prevention - The ability to detect, identify and neutralise natural and man-made threats, including people, vehicles and chemical, biological, radiological, nuclear and explosive (CBRNE) materials.

Examples of science and technology research include:

- Conduct remote, stand-off, non-invasive and portable sensing
- Conduct rapid and reliable CBRNE detection

- Countering/suppression of threat device remote initiation systems
- Means for the mass communication of incident and emergency information in crowded places (e.g. stadiums)
- Identify individuals and vehicles in complex environments
- Detect and track small unmanned vehicles (UV); and
- Remotely disable/control UV.

Integrated Information Sharing - The ability to share data and information across agencies and jurisdictions to achieve smooth, whole-of-nation operational response.

Examples of science and technology research include:

- Achieve smooth multi-agency Command, Control and Communications
- Integrated and interoperable communications and information systems; and
- Integrated sharing, management and fusion of data and information.

Enhanced Analysis - The ability to augment all aspects of analysis and decision-making in operational settings through advanced and artificial means.

Examples of science and technology research include:

- Assessment and development of vulnerability modelling tools to identify and prioritise risks and the development of mitigation options
- Use of event consequence modelling to plan emergency response requirements
- Conduct advanced analytics for enhanced detection, identification and tracking
- Conduct advanced analytics for enhanced situational awareness, analytics and decision-support
- Exploit social media and internet data; and
- Perform advanced analysis of extremism in social groups.

Robust Consequence Management - The ability of Australian individuals, communities and agencies to respond and recover quickly and effectively and minimise harm.

Examples of science and technology research include:

- Detect and remediate CBRNE events
- Model the evolution and impact of CBRNE events
- Protect first responders through knowledge of threat properties, safe handling, neutralisation procedures and personal protective equipment
- Utilise robotics and remote-controlled systems in hazardous environments; and
- Shape resilient people, communities, critical infrastructure and systems.

2. BORDER SECURITY AND IDENTITY MANAGEMENT CHALLENGES

National Security Community's ability to protect and secure Australia's borders from disease outbreaks, hazardous material and threats to our community, including maximum disruption effect on illegal activity and migration with projected growth in people and cargo movement across Australian borders.

Enhanced Analysis - The ability to improve the management and analysis of high volume data to support decision making with a focus on increasing the effectiveness and responsiveness of capabilities.

Examples of science and technology research include:

- Biometric fusion with biographical data
- Behavioural biometrics
- Enhance algorithm and human performance
- Artificial Intelligence; and
- Mobile collection devices.

Integrated Information Sharing - The ability to have a scalable and responsive information sharing system that provides seamless access to data and protects privacy.

Examples of science and technology research include:

- Data Fusion
- Single digital platform access
- Secure real time access; and
- Data protection, standards and privacy.

Improved Detection and prevention - The ability to rapidly and reliably detect, screen and track threats and contraband to prevent mass harm.

Examples of science and technology research include:

- Remote sensor technology
- Enhance human and technology detection performance;
- Surveillance for detection of biosecurity threats; and
- Surveillance for detection, alert and tracking of vessels.

Rapid and Reliable Identification (human, object, & CBRNE) - The ability to rapidly identify and verify humans, objects, CBRNE and biosecurity threats in support of border control/security, immigration and disaster victim identification.

Examples of science and technology research include:

- Biometric fusion with biographical data
- Behavioural biometrics
- Enhance algorithm and human performance
- Artificial Intelligence; and
- Mobile collection devices.

3. INVESTIGATIVE SUPPORT AND FORENSIC SCIENCE CHALLENGES

Law enforcement's ability to prevent, disrupt and prosecute terrorist and criminal activities in a complex transnational and evolving digital environment.

Enhanced Analysis - The ability to manage and interrogate large disparate data sets with a focus on improvement in productivity through machine learning (ML), automation and artificial intelligence.

Examples of science and technology research include:

- ML to advance pattern recognition
- Predictive analytics based on multiple data sets
- Exploitation of data sets rapidly
- Methods of translation for audio and visual
- Advanced biometric analysis; and
- The automation of current forensic processes.

Enhanced Detection and Identification - The ability to support traditional forensic and novel capabilities in the detection, identification and collection of reliable information in the field while maintaining the integrity of the evidence.

Examples of science and technology research include:

- ML to advance pattern recognition
- Predictive analytics based on multiple data sets
- Exploitation of data sets rapidly
- Methods of translation for audio and visual
- Advanced biometric analysis; and
- The automation of current forensic processes.

Advanced Protection and Exploitation - The ability to covertly obtain information across various sources whilst ensuring the protection of members.

Examples of science and technology research include:

- Deep analysis of systems
- Biomarkers identification
- Advanced methods and techniques for information collection
- The extended and remote monitoring methods for people, places and things
- Methods and tools to assess situations and environments; and
- Counter measure development to ensure protection of members.

Integrated Information Sharing - The ability to create secure and advanced networks and communication systems that allows the fusion of datasets and seamless information sharing.

Examples of science and technology research include:

- Single Platform data access
- Secure communications in remote access areas; and
- The fusion of disparate data sets to obtain forensic intelligence.