

# PARTNERING WITH WEAPONS AND COMBAT SYSTEMS DIVISION

Weapons and Combat Systems Division engages with Australia's industry and science and technology community through a range of innovative and mutually beneficial arrangements, and actively seeks opportunities to work with industry to commercialise DST technology and transition our innovative concepts into Defence capability.

## Potential areas for collaboration include:

- Human systems in tactical warfighting
- Tactical information integration and Interoperability techniques
- Concepts and tools to aid war fighter decision-making
- Architecture principles for integration and interoperability
- Researching configurable, human-in-the-loop facilities
- Advanced software and architectural design techniques for materiel protection
- Model development for weapons emulation
- High-power electromagnetics for directed energy
- Advanced sensing for cluttered environments (SPAD)
- New decentralised weapon guidance laws to enable teaming and collaborative sensing
- Transformative energetics for future weapon systems
- High performance propulsion missions including responsive space access
- High performance warhead concepts

## For further information

Email: [partnerwithdst@dst.defence.gov.au](mailto:partnerwithdst@dst.defence.gov.au)

[www.dst.defence.gov.au](http://www.dst.defence.gov.au)

# MAJOR RESEARCH PROJECTS AND ACTIVITIES

## Decision superiority

Through the increased use of automation/autonomy and operator decision solutions, Defence is able to make timely and effective tactical force-level response decisions.

## Future architectures

Intrinsically secure and adaptable systems through open, modular, distributed and scalable tactical systems of-systems architectures.

## Weapons technical intelligence

Deep knowledge of weapons and technical intelligence of systems and subsystems provides Defence with a capability for quantitative understanding of weapon systems performance.

## Integrated air and missile defence

Integrated tactical-level modelling, simulation and analysis (MS&A) allow Defence capabilities to identify the application, and performance, of tactical systems that support joint warfighting doctrine and increase mission success.

## Land active protection systems

Support to Future Force through constructive modelling and simulation of active protection system concepts enabling the evaluation and integration of future technologies.

## Shaping Future Force weapons and combat capability

Investing S&T into emerging and disruptive technologies including directed energy weapons, collaborative and swarming weapons, and high speed systems.

## Enabling future capabilities

Strategic research and development of advanced highspeed flight, boost and propulsion systems is critical to enable Defence to meet challenges in an emerging technology environment. Research and development of explosives and warhead technologies in collaboration with international partners is enabling game-changing Defence capabilities.

## Countering current and emerging threats

As Australia's primary source of expertise in energetic systems (including warheads, IEDs and counter-measure flares), WCSD is responsive to time critical Defence and national security requirements.



Australian Government

Department of Defence

Science and Technology

# PARTNER WITH DST

WEAPONS AND COMBAT SYSTEMS DIVISION



# Major Science and Technology Capabilities (MSTC)

Weapons and Combat Systems Division applies science and technology to the capability analysis, development and operation of weapon and combat systems relevant to the ADF. Areas of major science and technology capability are:

## MSTC Tactical Systems Integration

**Human and Autonomous Decision Superiority** The Human and Autonomous Decision Superiority group conducts research on integrated autonomous and human information assessment and decision-making in distributed tactical systems to provide superior decisions and warfighting capability.

**Tactical Information Integration and Interoperability** The Tactical Information Integration and Interoperability group conducts research that will ensure that relevant information is discoverable, accessible, available, usable, commonly understandable and actionable by all elements that need it in the tactical battlespace – both human and machine.

**Adaptive Information Architectures** The Adaptive Information Architectures group researches revolutionary software approaches to connect ADF platforms into a coordinated force that can 'fight through' threats and complex environments. The intent: to form re-configurable systems of sensors, decision algorithms and weapons that can out-adapt adversaries and deliver advantage.

## MSTC Tactical Systems Performance Assessment

**Weapons Systems Evaluation** The Weapons Systems Evaluation group conducts software and hardware experiments on weapons and their subsystems to deliver advice on weapon performance. Future weapon concepts are conceived, designed and evaluated to assess performance and inform subsystem requirements.

**Tactical Systems Modelling and Simulation** The Tactical Systems Modelling and Simulation group leads the modelling, simulation and analysis of the software-controlled decision-making systems within the tactical engagement chain – joint, maritime, air and land combat management systems – and researches simulation services within dynamic combat networks.

**Tactical Systems Assessment** The Tactical Systems Assessment group leads the performance analysis of complex, contested tactical engagement by: defining the analysis context, scope and objectives; composing and exercising integrated modelling and simulation-based solutions to enable analysis; and shaping the approaches used through its research into complex systems analysis methodologies.

## MSTC Weapons Systems Technologies

**Weapons Seekers and Tactical Sensors** The Weapon Seekers and Tactical Sensors group undertakes research in novel sensor technologies for weapons and tactical sensors to support advanced seeking, detection, tracking and navigation in complex, hostile and contested battlespaces.

**Sensor Processing and Algorithms** The Sensor Processing and Algorithms group develops and evaluates advanced algorithms for sensing and perception to enhance battlefield situational awareness and targeting.

**Collaborative Weapons and Autonomous Response** The Collaborative Weapons and Autonomous Response group undertakes research in trusted autonomous decision-making in weapons under uncertainty, and effective delivery of effectors to neutralise threats with precision and low collateral damage.

**Electromagnetic Effects Characterisation and Control** The Electromagnetic Effects Characterisation and Control group undertakes research and delivers S&T advice on complex electromagnetic (EM) interactions, high-power microwave weapons, and protection measures for ADF systems operating in congested EM environments.

## MSTC Energetic Systems Technologies

**Explosives and Pyrotechnics** The Explosives and Pyrotechnics group undertakes research into current and future military and home-made explosives, pyrotechnics, as well as explosive ordnance and devices containing energetic materials.

**Warheads and Effects** The Warheads and Effects group conducts research into high-performance warhead concepts and non-traditional explosive devices to understand, model, and exploit terminal effectiveness.

**Weapons Propulsion** The Weapons Propulsion group undertakes research into advanced weapon propulsion technologies including the safety and reliability of current and emerging ADF weapon propulsion systems.

**High Speed Systems** The High Speed Systems group undertakes research into high Mach number science – focusing on scramjet propulsion – and provides a capability to execute high Mach number flight test trials, including the design and production of experimental high speed flight test vehicles.

**Energetic Systems Capabilities** Research of the Energetic Systems and Effects branch is enabled by extensive fabrication and characterisation facilities, as well as an explosive ordnance management capability that supports the safety and assurance of explosive ordnance across DST.