



Australian Government  
Department of Defence  
Defence Science and  
Technology Organisation

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

# DSTO PARTNERSHIPS

for Australia's wealth and security

DSTO: Science and Technology for a Secure World

**DSTO**

DEFENCE SCIENCE AND TECHNOLOGY ORGANISATION



The Defence Science and Technology Organisation (DSTO) is part of Australia's Department of Defence. DSTO is the Australian Government's lead agency charged with applying science and technology to protect and defend Australia and its national interests.



Receiving soundwaves through fibre optic cable (Hydrophone)



Joint Strike Fighter

## DSTO PARTNERSHIPS FOR AUSTRALIA'S WEALTH AND SECURITY



**DSTO supports Australia's defence by:**

- ➔ Investigating future technologies for defence applications.
- ➔ Ensuring Australia is a smart buyer of defence equipment.
- ➔ Developing new defence capabilities.
- ➔ Enhancing existing capabilities by increasing operational effectiveness, improving safety, maximising availability and reducing the cost of ownership.

**Headed by the Chief Defence Scientist, DSTO has an annual budget of approximately \$400 million and employs more than 2,300 staff, predominantly scientists, engineers, IT specialists and technicians.**

**DSTO has a presence in nearly every state and territory in Australia. It has its national headquarters in Canberra with research facilities in Melbourne, Edinburgh (near Adelaide), Canberra, Brisbane, Sydney, HMAS Stirling at Rockingham (near Perth), Scottsdale in Tasmania, and Innisfail in northern Queensland.**

**DSTO works closely with industry and the science and technology community to enhance its ability to support Australia's defence and national security capabilities and to contribute to national wealth.**

## DSTO - CONTRIBUTING TO DEFENCE AND NATIONAL WEALTH

As the nation's lead agency in Defence-related science and technology, DSTO's primary objective is to enhance Australia's Defence capabilities. Of equal importance, is our responsibility to contribute to national wealth creation.

DSTO research and development often leads to the creation of valuable intellectual property. Wherever possible, DSTO transfers its intellectual property to Australian industry where it can be commercialised for Defence and, in some cases, civilian applications.

By transferring its technology to Australian industry, particularly small to medium enterprises, DSTO plays a significant role in creating jobs, generating national wealth and reducing Australia's reliance on overseas products and expertise. It also helps to build a stronger Australian defence industry.

As this booklet demonstrates, the opportunities for partnering with DSTO are many and varied. I encourage our industry colleagues to seek out and exploit those opportunities. I have no doubt that there are many successful partnerships ahead.



*Robert Clark*

**Professor Robert Clark**  
Chief Defence Scientist  
November 2008



Armed Reconnaissance Helicopter



Defence Industry Study Course



Nulka Active Missile Decoy



Hawk Lead-in Fighter

## MECHANISMS FOR ENGAGING WITH DSTO

DSTO works closely with industry and the science and technology community through a range of innovative and mutually beneficial arrangements.

### At a glance

DSTO technology licence agreements	90
Research agreements	57
Industry alliances	10
Collaborative agreements	45
Non-Disclosure agreements	45 <sup>1</sup>
Cooperative Research Centres	5
Centres of Expertise	7
“Own-source” revenue	\$6.6M <sup>2</sup>
Patents held	65
Patents pending	109

Current November 2008

<sup>1</sup> Number of agreements entered into in the 2007-08 Financial Year.  
<sup>2</sup> Non-government revenue.

### Defence Science Access Network (DSAN)

The DSAN is designed to encourage greater collaboration between industry, particularly small to medium enterprises (SMEs), and DSTO. The DSAN provides information on DSTO research, helps connect industry to DSTO and assists DSTO in seeking out industry R&D that may have Defence applications. The DSAN can be accessed from the DSTO website: [www.dsto.defence.gov.au/DSAN/](http://www.dsto.defence.gov.au/DSAN/).

### Capability and Technology Demonstrator (CTD) Program

The CTD Program, coordinated by DSTO on behalf of Defence, allows industry to demonstrate how advanced technologies might enhance ADF capability. In addition to contributing to the cost of projects, the CTD Program has a number of funding initiatives aimed at assisting industry, particularly small to medium enterprises to participate. These include seed funding, project viability funding and concept definition funding. For more information, go to [www.dsto.defence.gov.au/CTD/](http://www.dsto.defence.gov.au/CTD/).

### Defence Future Capability Technology Centre Program

The Defence Future Capability Technology Centre Program aims to bring together expertise and resources from industry, universities and publicly-funded research agencies to develop new technologies for enhancing Defence capability. The program is designed to develop specific future defence capabilities not currently addressed by Australian defence industry. DSTO was a key player in the development of the first future capability technology centre, the Defence Materials Technology Centre. This centre, headquartered at Swinburne University in Victoria, will deliver high-tech materials for Defence applications. It has received Australian Government funding of \$30 million, with a further \$52 million from the collaborative partners.

### Centres of Expertise

DSTO funds a number of Centres of Expertise with universities around Australia. Centres of Expertise enable DSTO to develop strategic research programs whereby academic research can be transitioned to real world applications.

The following table outlines DSTO’s involvement in Centres of Expertise:

Centre of Expertise	Partner University
Centre of Expertise in Energetic Materials	Flinders University
Centre of Expertise in Structural Mechanics	Monash University
Centre of Expertise in Aerodynamic Loading	Royal Melbourne Institute of Technology
Centre of Expertise in Photonics	University of Adelaide
Centre of Expertise in Helicopter Structures and Diagnostics	University of New South Wales
Centre of Expertise in Systems Integration	University of South Australia
Centre of Expertise in Defence Autonomous and Uninhabited Vehicle Systems	University of Sydney

Current November 2008

### Cooperative Research Centres (CRC)

The CRC program is an Australian Government initiative aimed at turning promising Australian research into successful new products, services and technologies.

DSTO has been involved in the CRC program for a number of years. It is currently active in the following CRCs:

- CRC for Advanced Composite Structures
- CRC for Integrated Engineering Asset Management
- CRC for Cast Metals Manufacturing

For more information about the CRC program, go to [www.crc.gov.au](http://www.crc.gov.au).



Quantitative Phase Imaging



Joint Direct Attack Munition – Extended Range (JDAM-ER)



Light-weight Armour



Smart Power Management

## TECHNOLOGIES DEVELOPED THROUGH CTDs

The success of a Capability and Technology Demonstrator (CTD) is dependent on a number of factors including the potential of the technology to contribute to the development of Defence capability and its potential to transition into service. DSTO is perfectly placed to assist industry in maximising the potential of their technologies to meet these two key criteria.

### Quantitative Phase Imaging

Iatia Limited is a small Melbourne company that has achieved commercial success in the life sciences and ophthalmology arenas. With an original specialisation in imaging microscopic biological structures, the company applied similar techniques to address much larger scale military problems involving the display of two-dimensional tactical images with greater depth and shape information. Through the CTD program, Iatia was able to show how its quantitative phase imaging techniques could allow a soldier to see through obscuring agents such as mist, fog, smoke and dust, as well as improving the ability to detect camouflaged targets.

### Smart Power Management

Engineering company Tectonica Australia Pty Ltd developed a CTD that involved the design, build and demonstration of a smart power management network that has the potential to be incorporated into the in-service soldier's load carrying equipment. The advantage to the soldier is a reduction in the overall equipment mass by distributing power from one central battery or alternative power source and eliminating the need to carry several types of batteries as spares.

During the final demonstration of their Smart Power Management system, Tectonica was able to showcase the utility of their technology by integrating their CTD with the Flexible Solar Panel, another CTD technology developed by a Canberra-based company called Sustainable Technologies International (STI). This integration was done with minimal previous interactions between Tectonica and STI and illustrates a new and exciting potential for the CTD Program. As the CTD program has matured, clusters of related technologies have been developed. The opportunity to create further synergies between projects, linking them together to form greater capabilities and promote interaction between Australian companies, is an exciting development.

### Light-weight Armour

The Light-weight Armour CTD was initiated to explore the feasibility of future ADF investment in the area of hard armour insert plates and combat helmets for soldiers. Utilising novel Australian manufacturing techniques, Melbourne-based company ADA Pty Ltd (Australian Defence Apparel P/L) demonstrated the potential to develop a light-weight product which provides protection against higher velocity threats, at a significantly reduced cost of manufacture.

In 2007, ADA capitalised on its successful CTD when it was selected as the preferred tenderer for an element of a significant Defence project (LAND 125).

### Joint Direct Attack Munition – Extended Range (JDAM-ER)

Defence, in conjunction with the Boeing Company and its subsidiary Hawker de Havilland has been developing and testing the JDAM-ER under the auspices of the CTD program. JDAM-ER is now being considered for further development for commercial production, which will lead to an operational product.

The JDAM-ER wing kit, developed by Hawker de Havilland based on DSTO technology, enables the 500 pound JDAM weapon to glide towards long range targets. The range of the launch aircraft's "fire-and-forget" capability is extended, allowing the JDAM-ER to launch at a safe standoff distance from the target.

The JDAM-ER program is an excellent example of how the transfer of technology from DSTO to industry can lead to ongoing collaborative activity and the development of an effective Defence product.

### Haptically Operated Robot

As part of the CTD Program, the Centre for Intelligent Systems Research (CISR), based at Deakin University in Geelong is developing robotic and haptic technologies and capabilities for the defence community within Australia.

The OzBot series of small and medium surveillance robots have been designed in Australia and evaluated by law enforcement and defence personnel to determine suitability and ruggedness in a variety of environments. The robots can be directly connected to many off-the-shelf payloads such as gas sensors, x-ray sources and camera systems including thermal and night vision.

Differentiating the OzBot platform from its peers is its ability to be integrated directly with haptic technology developed by CISR. Haptic interfaces allow an operator to physically 'feel' remote environments through position-force control and experience realistic force feedback. By adding the capability to remotely grasp an object, feel its weight, texture and other physical properties in real-time from the remote ground control unit, an operator's situational awareness is greatly improved through haptic augmentation in an environment where remote-system feedback is often limited.

In addition to the haptic manipulator, the OzBot platform has been fitted with a custom stereoscopic camera system to allow increased operator immersion with the aim of dramatically reducing operator training liability.

Remotely operated robotic devices can be used in the safe neutralisation of roadside IEDs (Improvised Explosive Devices), the removal of hazardous materials, and eventually in battlefield surgery. In addition to its Defence applications, the technology has the potential to be used in the medical and gaming sectors.



Haptically Operated Robot



Automatic Transcriber of Meetings (AuTM)



Tracked Vehicle Elastomer and Associated Technologies



Jindalee Operational Radar Network



Starlight

## DSTO TECHNOLOGIES TRANSFERRED TO AUSTRALIAN INDUSTRY

By transferring technology to Australian industry, particularly small to medium enterprises, DSTO plays a significant role in creating jobs, generating national wealth and reducing Australia's reliance on overseas products and expertise. It also helps to build a stronger Australian defence industry.

### Starlight

The unique Starlight system, developed by DSTO, allows users of secure computer systems to access insecure networks (e.g. internet) without compromising their own security. This technology has applications in both government and commercial environments. It is licensed to BAE Systems Australia Datagate and is marketed under the brands Interactive Link and Data Diode.

It is in use in the Departments of Defence, and Foreign Affairs and Trade and is also in operation in the USA, UK, Canada, Singapore and New Zealand. Starlight won a prestigious IT security competition as part of the combined World Congress on IT in 2002.

*"The Interactive Link and Data Diode product ranges are an excellent example of how innovative research and development in Australia can be successfully transitioned into products and services that remain global leaders in the growing market of Information Assurance."*

*Mr Kim Scott, Director Joint Business Unit, BAE Systems Australia*

### Laser Airborne Depth Sounder (LADS)

In the 1980s, DSTO developed the Laser Airborne Depth Sounder (LADS) to measure the depth of coastal waters with greater efficiency and speed compared with conventional shipborne sonar methods.

LADS is a transportable bathymetric survey system that uses a pulsed laser mounted in a fixed-wing aircraft. In the last fifteen years the LADS technology has generated over \$150 million for Australian companies and continues to find new international markets for different applications, especially in oil exploration and coastal survey work.

*"LADS can survey shallow waters up to 20 times faster than survey ships and at 30% of the cost, and that's creating business worldwide."*

*Tom Spurling, General Manager, Tenix LADS Corporation*

### Australian Minesweeping System (AMAS)

The Australian Minesweeping System (AMAS) exemplifies best practice in DSTO-industry interaction; it contributes to Australia's defence capability, engages industry as a partner and mutually shares risk, is genuinely collaborative, and generates commercial income and exports.

AMAS incorporates the DSTO-developed compact, self-powered Dyad sweep that emulates the magnetic signatures of target vessels, causing sea mines to detonate safely. Further developed by then ADI Limited (now Thales Australia Ltd), AMAS has earned over \$80 million in exports, with the Australian Department of Defence receiving over \$3 million in royalties. The system is in service with the navies of Australia, Denmark, Indonesia, Japan, Poland, Thailand and the USA. It has most recently been acquired by India.

The technology has been licensed to Thales for a further five years.

*"This collaboration between DSTO and Thales has allowed both parties to play to our strengths and continue to develop leading-edge MCM (mine countermeasures) capability. It is characterised by complementary skills in the mine warfare domain and shared risk-taking, with reinvestment of sales revenue and royalties in new technology and solutions. A true win-win situation for both parties."*

*Geoffrey Hixon, Manager, Mine Countermeasures, Thales Australia*

### Nulka Active Missile Decoy

Nulka is an ongoing success story for DSTO. This active missile decoy was developed in partnership with ADI Limited (now Thales Australia Ltd), BAE Systems Australia and the US Navy from an original DSTO concept. Nulka has revolutionised ship protection. When launched from the ship, Nulka can fly a pre-programmed flight path to entice sea-skimming missiles away from the target vessel.

Nulka is now deployed with the Australian, US and Canadian navies. It is recognised as the gold standard in active missile decoy systems worldwide, and has earned more than \$700 million in export sales.

As the prime contractor, BAE Systems Australia continues to explore the potential for marketing Nulka internationally.

### Tracked Vehicle Elastomer and Associated Technologies

Melbourne-based Mackay Consolidated Industries Pty Ltd has a number of license agreements with DSTO under which the company develops, manufactures and markets DSTO's tracked vehicle elastomer and associated technologies. These include ballistic materials, anechoic and other signature control materials, rubber formulations and processes to manufacture blended rubber stock for military tracked vehicles and other applications.

Mackay's track links and road wheels used on armoured vehicles include rubber components produced using DSTO's formulation. These are now in service with the ADF and have enabled Mackay to win significant export contracts. Both the track links and road wheels have proven to last much longer than previously by Mackay's local and overseas defence customers.

Mackay's partnership with DSTO has helped the company supply some 40 tonne of sound and vibration absorbing rubber product to each of the Collins Class submarines operated by the RAN.

*"Mackay continues to grow its defence business with the ADF, RAN and significant export contracts as a direct result of its close involvement with DSTO in material development programs."*

*Mr R Paton, Chairman Mackay Consolidated Industries*

### Jindalee Operational Radar Network

The successful handover in April 2003 of the Jindalee Operational Radar Network (JORN) to the Australian Defence Force capped 40 years of DSTO's pioneering research on the ionosphere, and hardware and software developments for signal processing and frequency management.

Australian industry has been involved in the development, operation and maintenance of the Jindalee system from the earliest days of the experimental test-bed sites near Alice Springs.

JORN is a significant contribution to broad area surveillance of Australia's strategic northern approaches. It also serves civilian purposes such as weather forecasting and the prevention of illegal entry, smuggling and unlicensed fishing.

### Automatic Transcriber of Meetings (AuTM)

AuTM uses speech recognition to aid in the transcription and annotation of meetings and other collaborative work. DSTO licensed this partly-developed speech recognition technology to Voice Perfect Systems Pty Ltd, based in Melbourne. Further development by the company involved a two-year project with the Isle of Man Parliament, which has already started using the technology.

The work on AuTM has now been readied for market in the form of a product called Multi-Speak, which is being released by Voice Perfect Systems under a commercialisation and licensing agreement with DSTO. Multi-Speak produces a fully interleaved and attributed text and audio record of the meeting, even when people speak simultaneously.

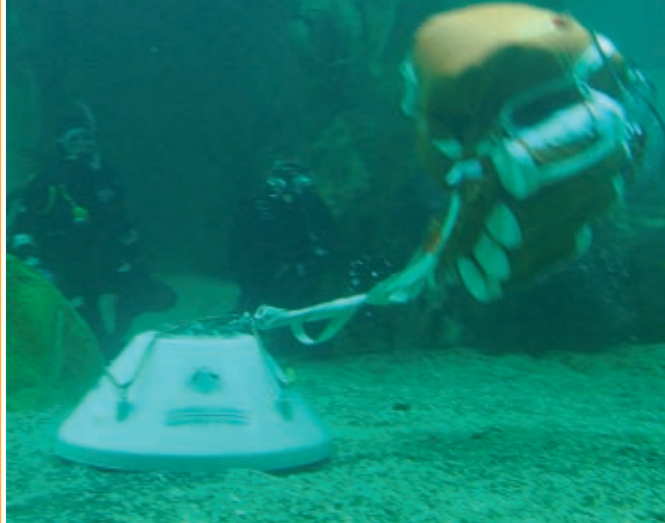
### Composite Bonded Repair Technology

Since 1972, DSTO has been the world leader in the development of composite bonded repair technology to prolong the life of high performance military aircraft. The technology involves adhesively bonding patches of advanced fibre composite materials to damaged aircraft structures to prevent or arrest cracking. The repairs have proven to be effective and long lasting in demanding military environments, resulting in savings of many millions of dollars for the RAAF.

In 1990, DSTO licensed the repair technology to the Australian-owned company Helitech Industries Pty Ltd to market on a world-wide basis, earning them significant export income. A major success was the restoration of damaged wing structures on the US Air Force C141 Starlifter fleet. The technology is now used by commercial airlines as well as the Australian, US and Belgian air forces.

### High Frequency Surface Wave Radar

This technology was developed by DSTO in the late 1990s and further developed by Daronmont Technologies as Surface-wave Extended Coastal Area Radar (SECAR). Following successful trials conducted in Australia, Daronmont Technologies is now pursuing a number of export opportunities. The High Frequency Surface Wave Radar (HFSWR) enables over-the-horizon detection of both ships and aircraft allowing countries to cost effectively monitor their coastline.



Cormorant Mine Lift Bag



Chemical Biological Combat Suit



Multi-Band Research Laser Infra-Red (MURLIN)



Off-Axis Viewing Device (OAVD)

## AUSTRALIAN TECHNOLOGIES DEVELOPED COLLABORATIVELY WITH DSTO

DSTO maintains strong relationships with other Australian research and development organisations, working with them whenever appropriate skills exist outside DSTO.

Interaction with organisations such as CSIRO and NICTA, Australia's Information and Communications Technology (ICT) Centre of Excellence, not only ensures optimal use of Australia's public research and development resources but also helps to broaden Australia's science and technology capabilities for both defence and civilian applications.

### Chemical Biological Combat Suit

DSTO and Australian industry have collaborated to develop a Chemical Biological (CB) suit that is more suited to hot and humid environments than previous protective garments, and also meets the ADF requirements for durability and functionality.

DSTO worked with an Australian company, Melba Industries, to develop a breathable tri-layered fabric that had the chemical adsorbent as the middle layer. As a result, the new ensemble is comfortable and manufactured as a single garment instead of an overgarment.

Melba Industries is the provider of the low burden CB Combat Suit to the ADF and continues to work with DSTO on a next generation suit with further enhanced properties.

### Non-melting Chocolate

DSTO is working with Swiss-based company, Nestlé, to develop new varieties of high melting point chocolate. Nestlé's transformation from a general food company into a health, nutrition and wellness company meant that they were more closely aligned to DSTO in the area of nutrition.

Army ration chocolate has qualities that make it an especially valuable component of combat ration packs. Chocolate has universal appeal, can be eaten on-the-go, is nutrient dense, can be fortified with vitamins and boosts morale.

While high melting point chocolate has been included in Australian ration packs for more than 40 years, the collaborative project is focused on enhancing the quality of the current ration chocolate and developing new varieties of dark and semi-dark ration chocolate to meet Australian Defence Force requirements for a highly palatable, nutrient dense, high melting point, and long shelf life product.

### Multi-Band Research Laser Infra-Red (MURLIN)

DSTO is working closely with industry to develop, test and evaluate advanced technologies to protect aircraft against air-to-air and surface-to-air infra-red weapon systems, such as Man Portable Air Defence Systems (MANPADS).

A five-year cooperative research and development program between DSTO and BAE Systems Australia has delivered a missile countermeasure laser unit, known as the AT MURLIN; the Advanced Tactical Multi-band Research Laser Infra-Red. This unit is the first Australian-built solid state laser capable of defeating IR missile seekers, such as those used in MANPADS. An improved DSTO-developed fibre laser architecture called the fibre (F) MURLIN is currently the focus of a Capability and Technology Demonstrator (CTD) awarded to BAE Systems Australia, which is to be delivered in 2010.

The DSTO expertise that inspired MURLIN has the potential to be transferred to industry for application on both Defence platforms and commercial airliners around the world.

### Hxl Braccetto

DSTO is working with CSIRO and NICTA on an internationally significant research initiative in the area of ICT-Augmented Human Interactivity, titled Hxl. The first project of the initiative, Braccetto, focuses on enhancing the ability of teams to work collaboratively across a distance. The project has developed new collaboration systems that can be rapidly deployed and adapted to support specific activities.

## AUSTRALIAN TECHNOLOGIES DEVELOPED WITH DSTO ASSISTANCE

DSTO assists Australian industry by offering it access to DSTO's unique research expertise and facilities, particularly where there are potential benefits for Australian Defence. This benefits everyone. Defence benefits from the development of a sustainable and competitive Australian defence industry. Industry benefits from exposure to DSTO's research base, introduction to defence markets, and income from domestic sales and exports. DSTO benefits through experience gained while providing support to industry, allowing it to enhance its research base.

### Cormorant Mine Lift Bag

DSTO developed the Cormorant Lift Bag as a safe and reliable method of removing underwater explosive mines. It is capable of lifting heavier underwater objects from greater depths than conventional recovery systems. The technology was developed by DSTO and the Royal Australian Navy in partnership with two small Tasmanian companies Liferaft Systems Australia and Fiomarine Industries Pty Ltd. The Cormorant Lift Bag is deployed on Australia's six Huon class Coastal Minehunter ships, and has been purchased for use by the Singapore Navy.

### Systems Capability Assessment Model

Complex systems analysis work done by DSTO in support of major Army projects resulted in the development and commercialisation of a tool designed to support large-scale capability analysis.

DSTO signed an agreement with Canberra company Aerospace Concepts Pty Ltd for the commercialisation of the Systems Capability Assessment Model (Systems CAM). The agreement allows Aerospace Concepts to use the tool with clients in industry and overseas.

## DSTO TECHNOLOGIES LICENSED TO INTERNATIONAL ORGANISATIONS

DSTO prefers to license its technology to Australian-owned companies, however there are circumstances where there may be significant benefits in licensing to an overseas-based organisation. There are also occasions where no Australian company has the technical or marketing expertise.

### Off-Axis Viewing Device (OAVD)

DSTO has achieved a restricted global market of certified end users for its off-axis viewing device (OAVD) by licensing the technology to Swedish company Aimpoint. The device, a small arms attachment that integrates with the weapon's sighting system, enables the soldier to scan and engage targets from a position of cover.

Aimpoint, the originator of the red dot rifle sighting technology, was seen to be a prime candidate for the technology licence, having achieved sales of its military scope in the order of hundreds of thousands over the last couple of years. The OAVD is currently being deployed with the Australian Defence Force as an attachment to the Aimpoint optical sight.

### Helicopter Gearbox Diagnosis Technology

Helicopter Gearbox Vibration Technology developed by DSTO to monitor the health of helicopter gearboxes won international recognition in 1999 when a licence for the technology was bought by US company Chadwick-Helmuth Company Inc, one of the world's largest producers of aviation vibration analysis equipment.

Chadwick-Helmuth was later purchased by Honeywell International Inc, with whom DSTO has signed a new licence for the technology to be incorporated into its helicopter diagnostics products. Sales of these products by Honeywell commenced in early 2008.



## CONTACT INFORMATION

### Assistant Secretary Science Industry and External Relations

Defence Science and Technology Organisation  
Science Industry and External Relations Branch  
F2  
Fairbairn Business Park  
Canberra ACT 2600

Tel: +61 2 6128 6377

Fax: +61 2 6128 6383

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

For information about business opportunities with DSTO, contact:

### Director Business and Commercialisation Office (Melbourne)

Tel: +61 3 9626 7556

Fax: +61 3 9626 7091

### Director Business and Commercialisation Office (Edinburgh)

Tel: +61 8 8259 7882

Fax: +61 8 8259 6541

### Director Capability and Technology Demonstrator Program

Tel: +61 2 6128 6488

Fax: +61 2 6128 6498

### Defence Science Access Network

Email: [dsan@dsto.defence.gov.au](mailto:dsan@dsto.defence.gov.au)