

UNCLASSIFIED



Australian Government

Department of Defence

Defence Science and Technology Group

# DST Group Partnership Week 2016

## Partnership Opportunities

### Land Division

Dr Peter Shoubridge, Chief Land Division

**DST**  
GROUP

Science and Technology for Safeguarding Australia

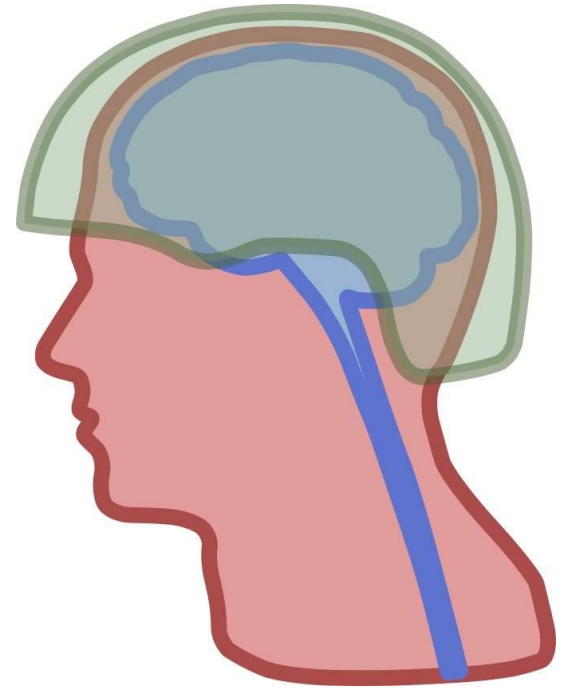
# Land Division Partnerships

- Success stories
  - **Physical Employment Standards:** Soldiers fit for trade tasks
  - **Off Axis Viewing Device:** Commercially successful innovation
  - **Diggerworks:** Modernisation of the Soldier Combat Ensemble
- Potential Strategic Partnership opportunities in the future include
  - Cognitive performance & resilience
  - Autonomous Systems
    - Urban Operations with Multi-Mission Autonomous Systems
    - Logistics for distributed combat service support
  - Power and Energy
  - Medical countermeasures



# Announcing HPRRnet.

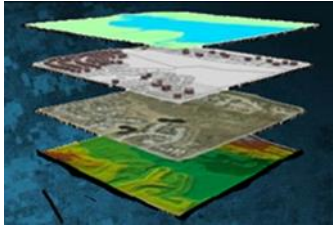
- Human Performance Research *network*
  - Army and DST Group initiative [\$4m over 4 years]
  - Forming a network of leading research teams from across Australia
  - Co-investment to design and implement creative research to seize and sustain an edge on the future battlefield by ...  
Better selecting, preparing, equipping and sustaining the warfighter.



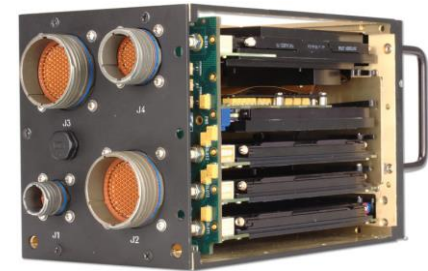
# Combined Arms Fighting Systems Integration



PL CAFSI  
Brian Reid



- Generational change in Armoured Capability Land 121, Land 400, Land 907 over next 5 years
- Transition to software defined capability and spiral upgrades



# Potential partnership opportunities

- On-board software applications
- Software defined sensors & effectors
- Image sensing and processing technology
- Integrated survivability technologies
- Human machine interactions technology
- Operations enablers
- Technology enablers



# Major Science and Technology Capabilities

## Land Human Systems

Dr Nick Beagley



- Social Science
- Cognitive
- HSI & Ergonomics
- Physiology
- Injury
- Food & Nutrition

55 Staff

## Land Vehicles & Systems

Dr Axel Bender



- Armour
- Logistics
- C2 Systems
- Vehicle Systems
- Architectures
- Integration

51 Staff

## Chemical & Biological Defence

Dr Greg Coia

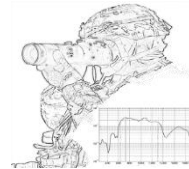


- Medical Countermeasures
- CB Surveillance
- Synthesis
- Detection
- Protective Equipment
- Hazard Management

48 Staff

## Land Personnel Protection

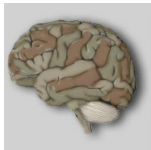
Dr Torgny Josefsson



- Counter Surveillance
- Power & Energy
- CBR Modelling
- Functional Materials
- Radiological Defence
- Vulnerability

29 Staff

# Land Human Systems



## Cognition & Behaviour (Adelaide)

“Preparing and understanding the minds of soldiers”

Dr David Crone (acting)



## Food & Nutrition (Scottsdale)

“Providing the food required, understanding the food desired”

Mr Ross Coad (acting)



## Physical Ergonomics (Melbourne)

“Getting the best person and best equipment for the task and environment”

Dr Mark Patterson



## Program Highlights

Organisational Learning

Simulation for Training

Combat Ration Enhancement

Physical Employment Standards

Diggerworks

Soldier Vehicle Integration

Injury Prevention

## Partnerships



University of Sydney (Cognitive Performance)



Rheinmetall (Simulation for Training)



CSIRO/UTAS (Centre for Food Innovation)



Griffith University (Consumer & Biomech)



University of Wollongong (PES CoE)



University of Melbourne (Physical Injury)



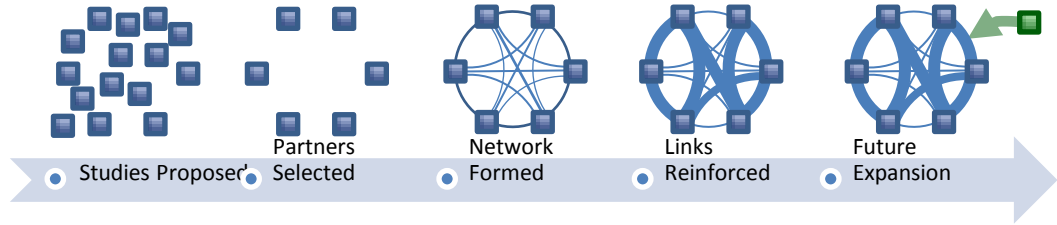
Victoria University (Physical Assistive Technologies)



# HPRnet

Human Performance  
Research network

## Formation

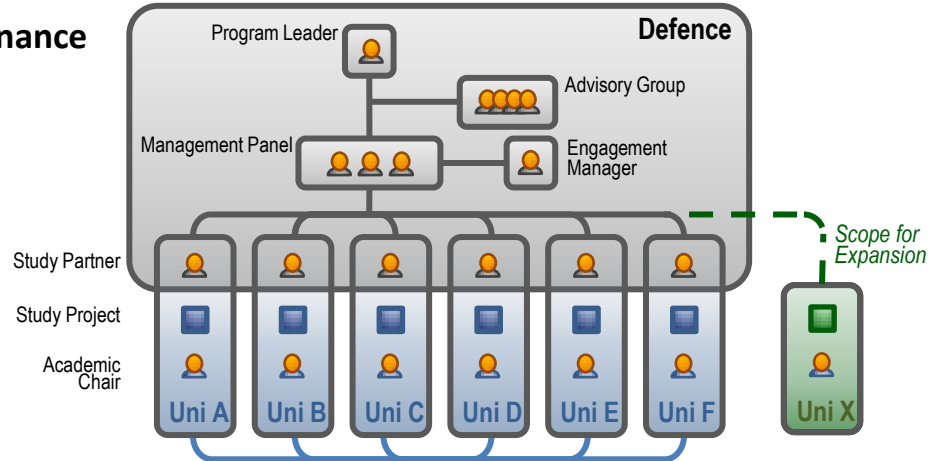


- Expressions of Interest invited for studies that address a defined set of Army Human Performance Research priorities

[See web link for details]

<http://.....>

## Governance

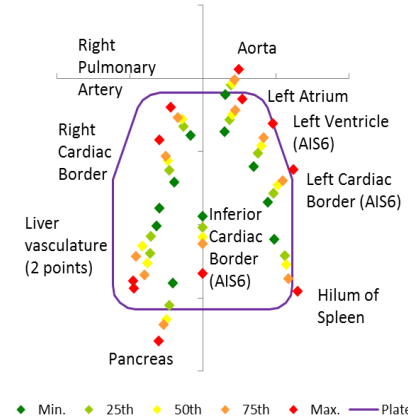
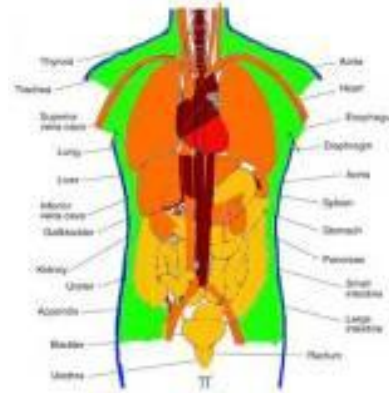
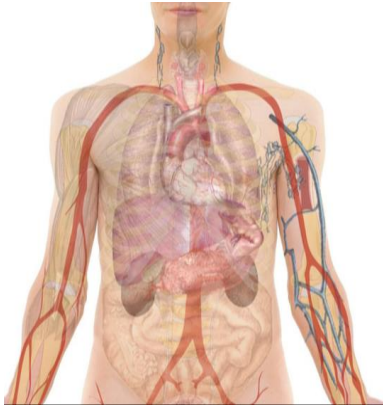
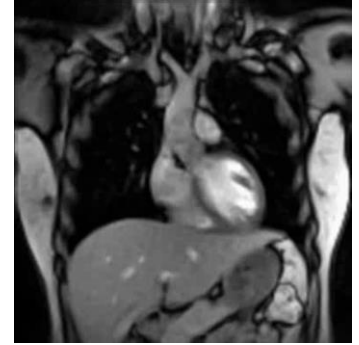




# Potential Partnership Opportunity

## Organ Mapping

- Variation in size and location of vital organs across the warfighter population
- Inform the design of protective systems



# Land Vehicles and Systems



## Vehicle Survivability (Melbourne)

“Science to Survive and Win”

ARL



Mr Paul Phillips (Acting)



## Land Logistics (Adelaide)

“Science of Sustaining the Army”



Mr Stephen Baker (Acting)



## Advanced Vehicle Systems (Adelaide)

“Breathing Life into Combat Vehicle Backbones”



Dr Axel Bender

## Program Highlights

Smart Federations of On- and Off-board Digital Services

Autonomic Control of Vehicle-Hosted Applications

Vehicle Health and Usage Monitoring

Land Capability Integration (CDG 07/358)

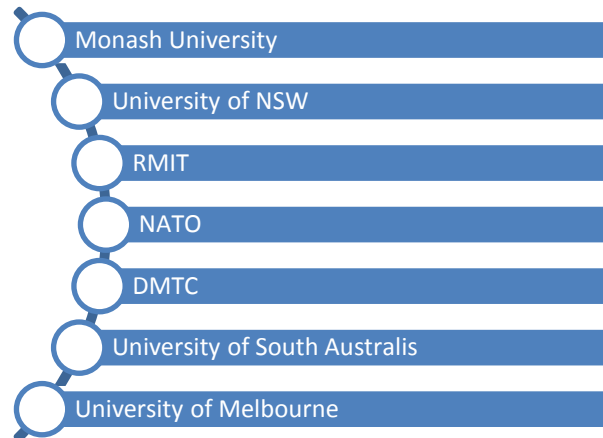
Land Combat Vehicles (CDG 07/357)

Special Ops Systems Support (CDG 07/352)

Logistics Projects and Studies (ARM 07/306)

Land Vehicle Protection (DMO 07/130 & ARM 07/132)

## Partnerships



## Systems Integration and Tactical Networking (Adelaide)

“Unlocking the information for Decision Superiority”

LNIC



Mr Kevin Goldsmith (Acting)

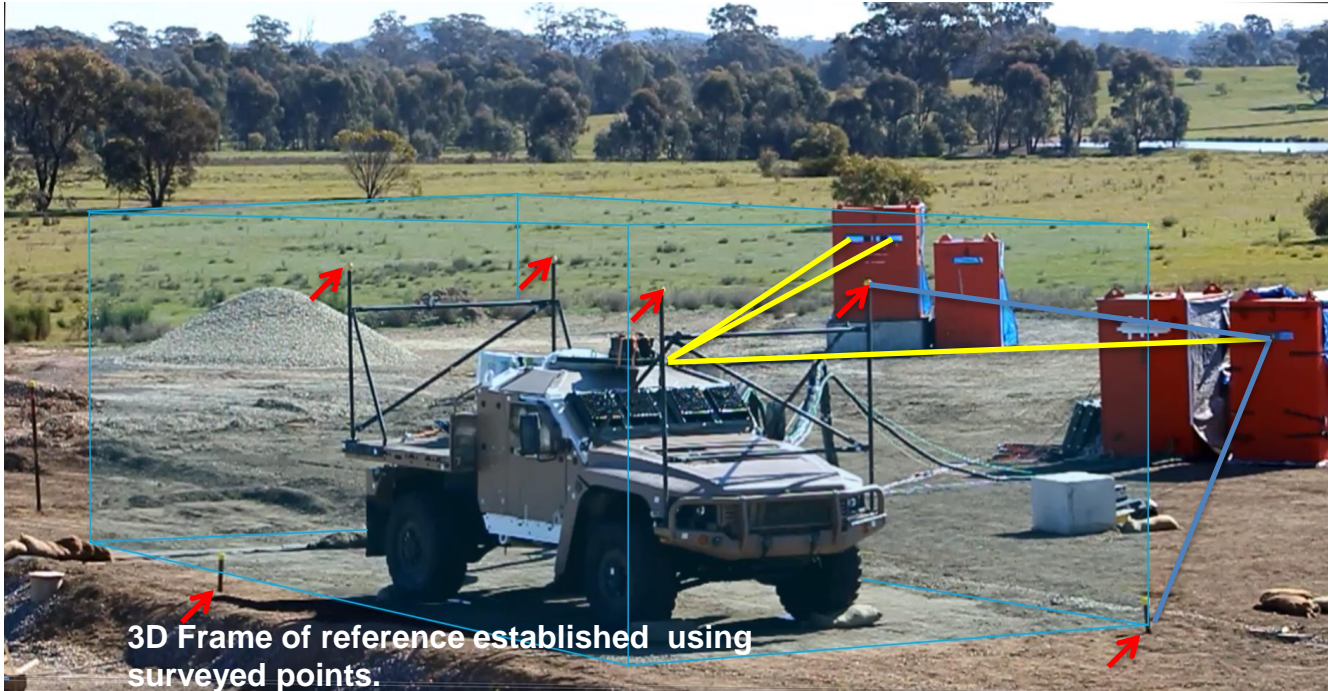
Specialist Science Advisors



Staff Officer Science



# Potential Partnership Opportunities



Any point of interest in the 3D space can be tracked & measured in relation to the static field of reference.

# Tracking and measurement of ultra-fast objects using high-speed 3D video capture

3-D Calibration

Frame of Reference Calibration

The screenshot shows the '3-D Calibration' software interface. It features two video frames of a vehicle with tracking points and a control panel. The top frame is titled 'Frame of Reference Calibration' and shows a vehicle with tracking points 1 through 13. The bottom frame shows the same vehicle with tracking points 1 through 13. The control panel includes sections for 'Fixture' (Standard Fixture, Load Fixture from File, Fixture Units: Meters), 'Points' (Manual/Automatic, Define First/Second Region, Locate, Align, Display and Edit Points, Import Point Coordinates, Graph Points), and 'Calibrate' (Calibrate, View). A timeline at the bottom shows a scale from -0.00 to 3.00.



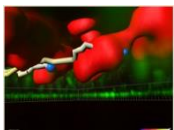
# Chemical & Biological Defence



## Agent Chemistry and Verification (Melbourne)

“Enhancing the understanding of chemical hazards and toxins and verifying their use”

Dr Harry Rose



## Medical Countermeasures (Melbourne)

“Countering Chemical and Biological Weapons”

Dr Peter Gray



## Biosurveillance and Biodetection (Melbourne)

“Meeting Defence and National Security needs for rapid diagnostics and detection of CB warfare agents”

Dr Mick Alderton



## Program Highlights

Counter NTA, Ricin and Q-Fever

Civilian CT and National Security

Support to L2110 and L3025

Support to DIO

Support to SOER

Support to Joint Health Command

Counter Proliferation and Arms Control

## Partnerships



LaTrobe University



University of New South Wales



Flinders University



CBR MOU



Monash University



Bio 21



CSIRO



## Individual Protection and Hazard Management (Melbourne)

“Evaluation and development of protective ensembles to meet ADF requirements”

Dr Rebecca McCallum



# Black Canary – *Multiple partnerships worldwide*



ideationdesign

- June 2008 DST Group miniature optical detection program started in collaboration with **MiniFab** and **Catapult**
- Aug 2010 CTTSO-TSWG funding application for BLACK CANARY projects approved for DST Group/Catapult sports/iWRX to deliver the BLACK CANARY personal air monitor
- June 2013 **Swinburne University** and **Deakin University** engaged to successfully assist the program with humidity management issues on optoelectronic components
- June 2014 Working prototype BLACK CANARY prototype delivered and tested
- Oct 2015 **DST Group** and **Ideation Design Solutions** contracted by CTTSO to develop pre-production BLACK CANARY by late 2017
- March 2016 DST Group in license negotiations with a **multinational detector manufacturer** for production of the BLACK CANARY



**CTTSO** *Combating Terrorism  
Technical Support Office*

# LAND miniature detection program linkages



## Programs to date:

Approx. 10 FTE staff years within DST Group

Total revenue : In excess of \$AU3.5 million

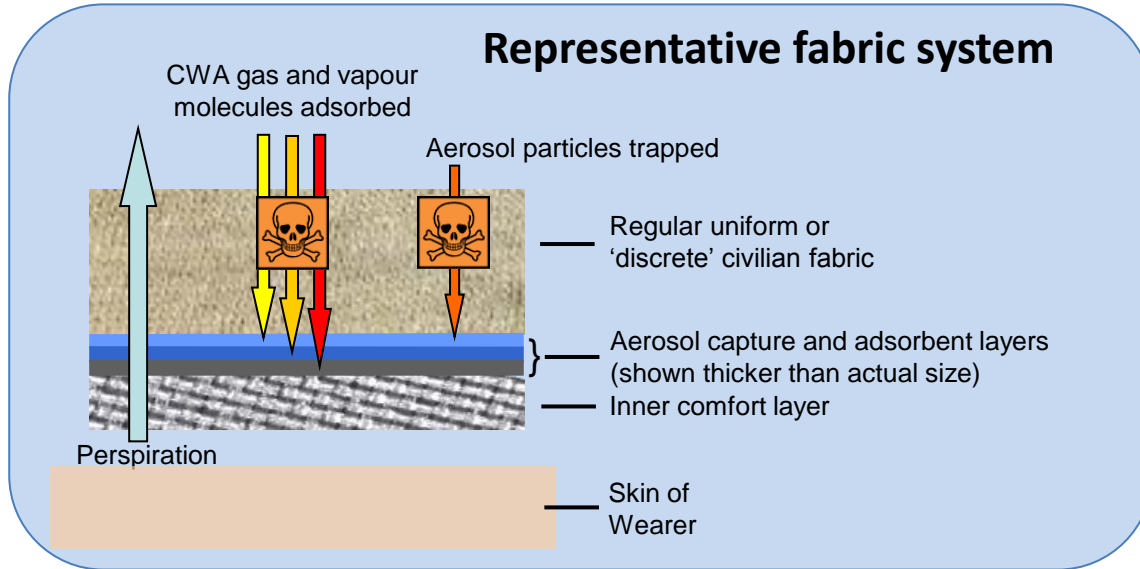
Of which approx. 70% has gone to companies and academia as collaborative partnerships



# DMTC Project 7.33 – Gov't, University, Industry

Advanced Nanostructured Fabrics for Low Burden Personal Protection:

- Development of an enhanced performance fabric system for CBR protection using nanofibre membranes



Australian Government

Department of Defence  
Defence Science and  
Technology Group



CSIRO







The MCM program will focus on the advanced development of technologies relevant to the national preparedness strategy. It will include the development of an integrated capability to reduce dependence on non-Australian sources for MCM products.

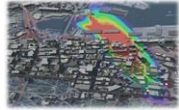
#### Program Themes

The program themes include Diagnostics, Antimicrobial Resistance, and Security Sensitive Biological Agents (SSBA).

#### Program Impacts

- Create a dynamic portal to Australia's MCM product development capabilities to efficiently work with other members of the international MCM Consortium to translate cutting edge science and technology into innovative, safe and effective products.
- Evaluate the safety, efficacy, quality and performance of MCM products using regulatory science tools, approaches and advanced development methods.
- Ensure a robust and sustainable product pipeline for MCM that emphasises multi-functional capabilities rather than stand-alone outcomes.

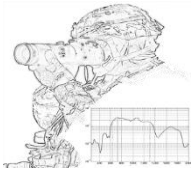
# Land Personnel Protection



## Hazard Assessment (Melbourne)

“Informing the war-fighter”

Dr Mike Roberts



## Integrated Personnel Protection (Melbourne)

“Protecting the war-fighter”

Mr Tim Bussell



## Enabling Systems & Concepts (Melbourne)

“Enabling the war-fighter”

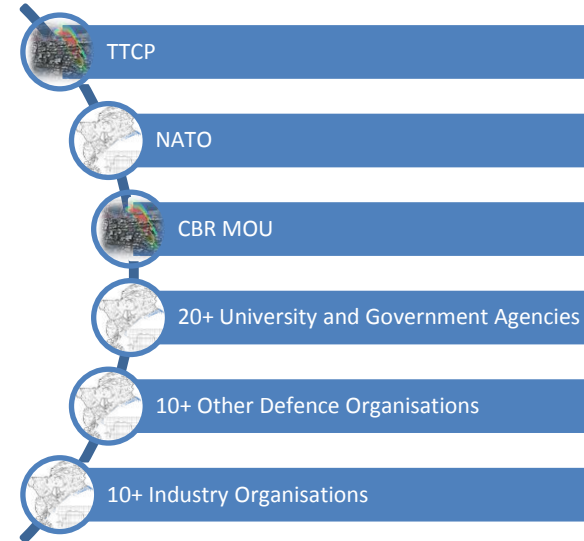
Dr Michael Ling



## Program Highlights

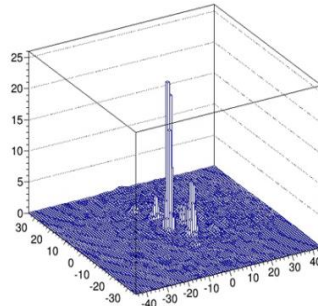
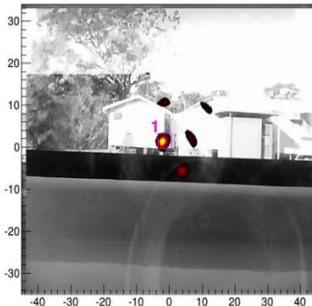
- CBRNfx
- Radiological and Aerosol Defence
- Support to SOCOMD
- Power and Energy
- Battle Damage Assessment
- Blast and Ballistics Protection
- Bio-Terrorism Preparedness SRI
- Camouflage and Signature Management
- Soldier Combat System
- Civilian CT and National Security

## Partnerships



# Potential partnership opportunities

**Radioactive Source Imager** – gamma ray imager for detection, localization and characterization of hidden radiological and nuclear sources without exposing counter-terrorism personnel to hazards





Thank You

