



## Defence Capabilities

The University of Newcastle is very supportive of developments within the Hunter region, and the RAAF / Newcastle Airport precinct constitutes an important dimension of the Hunter economy. The growth in the high tech defence sector is a pleasing development that will add to the Hunter economy.

The University of Newcastle is a medium to large sized regional University that offers a comprehensive range of subjects to undergraduate and postgraduate students. It has in excess of 26,000 students and 800 full-time academic staff. It has a robust international reputation for research in Health, Engineering and Technology related disciplines. We are regularly ranked in the top 10 Universities in Australia for research and ranked in the top 100 Universities for Engineering in the prestigious Shanghai Jiao Tong index (2007).

### 5 faculties:

- Business & Law;
- Education & Arts;
- Engineering & Built Environment;
- Health;
- Science & IT

<http://www.newcastle.edu.au/faculty/>

### Priority Research Centres for:

- Advanced Particle Processing;
- Asthma & Respiratory Diseases;
- Bioinformatics, Biomarker Discovery & Information-Based Medicine;
- Brain & Mental Health Research;
- Complex Dynamic Systems & Control;
- Energy;
- Gender, Health & Ageing;
- Geotechnical & Materials Modelling;
- Reproductive Science;
- Organic Electronics;

<http://www.newcastle.edu.au/research/centres.html>

## **Examples of relevant collaboration**

### **Space Physics**

The Centre for Space Physics at the University of Newcastle conducts research into space weather processes that disturb the upper atmosphere, in particular the propagation of radio waves. Part of this research requires collaboration with La Trobe University, operating over-the-horizon radars in Tasmania and New Zealand, and magnetometers at various locations in Australia and Antarctica.

Our research centre does not have a current field site near Newcastle. However, our activities interconnect with those of other research groups in Australia under the umbrella of the Decadal Plan for Space Science developed for the Australian Academy of Science. This includes strong support from IPS Radio and Space Services (a unit of the Bureau of Meteorology), Geoscience Australia (a Federal agency), Antarctic Division, and a variety of other departments and organisations including CISCO. Remote sensing is also a strong component of the Decadal Plan.

Our work is of particular interest to the defence community, since the backbone of Australia's surveillance capability is the JORN over-the-horizon radar network operated by Defence Science and Technology Organisation (DSTO). The extent of the defence community's interest can be illustrated by the New Zealand example where 50% of the funding for the current radar came from the US Air Force.

The RAAF base at Williamstown is the coordination centre for Australian surveillance activities. The University of Newcastle has a long-standing interest to construct an over-the-horizon radar near Newcastle, in order to study factors that affect radio propagation more locally. The RAAF Williamstown base commander had previously been keen to have such a facility at Williamstown (mainly to assist with training), however, Department Of Defence Canberra has not been forthcoming with approval to date. DSTO has recently promised support to construct another radar near Adelaide.

### **Operations Research/Optimisation**

Professor Natasha Boland leads an expanding enterprise in the Operations Research/Optimisation area at the University of Newcastle. Operations Research/Optimisation provides flexible modelling tools and underlies software products that are highly valued, most especially in the airline and defence communities, but also in any logistics/supply chain setting where greater efficiency is sought. Professor Boland's achievements to date include the following:

1. leading a large research initiative developing airline planning systems that are better integrated, provide plans for aircraft and crew that are more robust to operational changes, and yield lower cost on-the-day recovery options (in collaboration with Monash University, support from a Melbourne software company - CTI Pty Ltd, and the Federal Govt).
2. Developing an air crew scheduling system for a Melbourne software company (now a Boeing subsidiary under the Jeppesen flag), including new methods for aircraft routing, maintenance planning and maximizing passenger revenue opportunities.
3. Delivering optimisation solutions to industry and Government clients ie developing a sourcing and distribution model for Hi Fert Pty Ltd, using 12-month forecasts to determine minimal

cost sourcing plans, ship loading and routing plans, and trucking movements, for all fertilizer raw materials in the company's supply chain. This model was delivered in a desk-top system with an Excel interface, hooked into the company's back-end ERP (SAP).

4. Working with the US Army's Concepts Analysis Agency developing optimisation models to plan the European force draw-down so as to minimise the combination of one-time and ongoing operational costs.
5. Collaborating with DSTO investigating models for deployment logistics that could support ongoing capacity planning, and including one for an Australian Army client, developing force deployment models that allowed the user to explore trade-offs between alternative options for addressing military objectives in planning scenarios, thus providing the ability to assess alternative force structures.
6. Developing a variety of projects on infrastructure/asset planning and management ie working with Melbourne Airport to assess alternative design options and bus specifications optimising the best cost-to-service trade-off in the redevelopment of their new long-term car park.
7. Collaborating with BHP-Billiton and UNSW researchers working on open-pit mine production scheduling; this research supports BHP-Billiton's in-house mine planning software development team.
8. Leading a group funded by Port Waratah Coal Services working in collaboration with the Hunter Valley Coal Chain Logistics Team to undertake research on the coal export supply chain.

For more information about the University of Newcastle, please visit [www.newcastle.edu.au](http://www.newcastle.edu.au) or contact phone +61 2 4921 5000 to make a general enquiry.