



PhD research Opportunity at University of New South Wales

Research topic: **Developing simulation models to analyse the potential impacts of emerging technologies on collective capabilities under uncertainty**

We are looking for a PhD candidate from the fields of operations research, systems science or other related fields such as computer science. Applicants **must hold** an Australian citizenship at the time of application.

The first round of evaluating the Expressions of Interests (EOIs) will start on the **15th December 2020**, but we still welcome EOIs after this date and until the position is filled. The commencement of enrolment will be discussed with the successful candidate.

We offer an opportunity to work on an interdisciplinary research project in partnership with Defence Science and Technology Group (DSTG), and a prestigious top-up scholarship of **AUD \$15,000 per year** for up to 3.5 years.

PhD Research Project Description

The design of Australia's defence force constitutes a complex decision problem with high levels of uncertainty involving multiple interdependent factors that change over time. One key factor focuses on evaluating the impact of new, emerging technologies under different and evolving operational conditions. In such contexts, decision making can be supported and enhanced by building quantitative simulation models representing experts' assumptions about the causal relationships and feedback effects at work in the system. Once developed, the simulation model(s) can help assess the potential contributions of new technologies to operational effectiveness, identify unintended consequences, assess systemic risks, and devise plans to exploit opportunities and mitigate risks. This interdisciplinary research project aims to develop a model-based learning methodology to support decision makers with the analytical methods needed to address these challenges. The development and use of a library of system dynamics simulation models, within a multi-method research design, will be central to the research. The simulation models will enable evaluation of a range of different defence-oriented technological concepts across a set of selected operational contexts (focussed on tactical land warfare). In addition, the modelling methodology will provide the design principles to guide the use of system dynamics models within a multi-method approach to analyse the broader class of problems encompassing the evaluation of emerging technologies under uncertainty.

Keywords: System Dynamics, simulation modelling, computational modelling, multi-method, defence, emerging technologies

Description of Ideal Candidate Skills and Experiences

- A Bachelor of system science, operations research, systems engineering, or related fields such as computer science, with first class honours or equivalent (e.g. Bachelor + Master by Research/Master by Coursework + publications).
- Demonstrated experience with statistical and computational analysis is essential.

- Demonstrated background in simulation modelling (in general) and system dynamics (in particular) is highly desirable.
- Self-motivation and curiosity to work in an inter-disciplinary area and cross-institutional research environment.
- Ability to work in a team and strive for research excellence.
- Excellent oral and written communication skills.

Supervision team

The joint-supervision team will consist of two leading academics and an analyst from the Defence Science and Technology Group: Professor [Shayne Gary](#), Associate Professor [Sondoss Elsworth](#) and [Dr Matthew Richmond](#). The supervisory team possesses a strong research track record of applying systems modelling across different applications, including defence; as well as extensive experience in applying operations analysis and modelling support to future land force design (i.e. in direct support of Army Headquarters). The team has extensive experience disseminating research results via peer-reviewed publications, and will guide and support the candidate to access relevant subject matter experts and to publish & develop a solid basis for future career development.

To apply, please send the following documents in an email to: s.elsawah@unsw.edu.au.

- A recent CV
- An expression of interest document explaining why you are interested in this specific opportunity and how you meet the required skills and experience. It would be helpful to include information about the relevant courses/training you have completed.

If you have any questions, please contact Associate Professor Sondoss Elsworth (s.elsawah@unsw.edu.au).