



Australian Government
Department of Defence
Defence Science and
Technology Organisation



**\$30,000 Sponsored Masters Scholarship
through the
Graduate Industry Linked Entrepreneurial Scheme – GILES**

G02/08 - Combat Vehicle Crew Workload and Performance

Objective of Project

The Land Operations Division (LOD) of Defence Science and Technology Organisation (DSTO) is currently supporting the Defence Project LAND 400. LAND 400 aims to provide enhanced land force survivability and combat effectiveness through the provision of combat vehicle systems with superior mobility, knowledge, lethality, protection and sustainability which can fight and win close combat engagements in open or complex terrain.

A major LOD work package in support of LAND 400 is a Human Factors Integration (HFI) study. Investing in the HFI analysis ensures a greater consideration of user capabilities and limitations within the system design process which ultimately leads to improved overall system effectiveness. It also provides a means of identifying the correct balance of investment between highly automated systems and simpler equipment, and the generation of effective and efficient working environments, and makes sure health and safety risks implication are recognized and understood.

The Combat Vehicle Crew Workload and Performance study provides support to the LOD HFI work program with a focus on human performance within the combat vehicle system. A clear understanding of what the users of a system actually do is fundamental to most aspects of HFI and feeds into many other activities. The scope of what the operators are required to do is captured in a task description which is applied in a task analysis to explore the implications of these tasks in terms of the operator's ability to undertake them. The assessment of the operator's ability to undertake them will help to identify the workload that can be achieved, and will consequently inform and aid decisions about interface design, impact of automation, allocation of function, the risk of operator overload, etc.

The objectives of the Combat Vehicle Crew Workload and Performance study are:

- To develop baseline crew workload performance measure for selected crew roles in current combat vehicles
- Support the development of a modelling and simulation capability to explore future crew tasking, workload and performance
- Provide insights into the impact of future technologies on crew performance

A key tool in the assessment of the Crew Workload and Performance is the IMPRINT software package to model the interactions between humans and the systems within the vehicle.

Improved Performance Research Integration (IMPRINT) Tool

IMPRINT¹ is a Human Systems Integration tool developed by the U.S. Army Research Laboratory, Human Research & Engineering Directorate. It is a dynamic, stochastic discrete event network modelling tool designed to help assess the interaction of soldier and system performance throughout the system lifecycle - from concept and design through field testing and system upgrades.

As a system design and acquisition tool, IMPRINT can be used to help set realistic system requirements; to identify soldier-driven constraints on system design, and to evaluate the capability of available manpower and personnel to effectively operate and maintain a system. IMPRINT is also used to target soldier performance concerns in system acquisition, to estimate soldier-centred requirements early, and to make those estimates count in the decision making process.

As a research tool, IMPRINT incorporates task analysis, workload modelling, performance shaping and degradation functions and stressors, and embedded personnel characteristics data.

Project Specification and Timetable

The work program is envisaged to be conducted over a 12-month period and should address the following key activities.

- Review of existing Crew Workload and Performance literature for combat vehicles.
- Become knowledgeable in the theory and application of IMPRINT to combat vehicle analysis.
- In collaboration with LOD staff, conduct experiments, in-barracks and field related trials to collect task performance data on selected Army vehicles to populate IMPRINT.
- Explore future combat vehicle human performance issues. These could include:
 - Testing alternate system-crew functions allocations, and
 - Examining the impact of automation and enhanced situational awareness capabilities.
- Report on the results of investigations conducted.

Personal Requirements

The graduate needs to be:

- Highly motivated with an ability to work with both minimal supervision and as a member of a small team, depending upon the specific needs of the project.
- Have strong research and analysis skills in human factors, in particular in task analysis and human workload performance.
- Resourceful in developing an understanding of the analysis tool and innovative applications for the tool.
- Willing to participate in Army barracks and field activities.
- Able to present study findings in written and verbal reports.

¹ <http://www.arl.army.mil/ARL-Directorates/HRED/imb/imprint/Imprint7.htm>

Academic Qualifications

Graduates would be expected to have qualifications in the human factors and psychology disciplines.

Other Requirements

If the graduate has had any exposure or demonstrated interest in the following topics it would be an advantage:

- The military, in particular Army.
- Vehicles

The graduate will require a security classification at the **Restricted level** in order to access relevant information sources.

Division and Contact Person

The graduate would be expected to work in the DSTO Land Operations Division in the LAND 400 analysis team under guidance from team leader Mr Nicholas Kempt.