



**MONASH University**  
**Accident Research Centre**  
**Annual Report 2010**

[www.monash.edu.au/muarc](http://www.monash.edu.au/muarc)



*Ms Nimmi Candappa, Dr Bruce Corben and Dr David Logan, from the Safe System Strategy and Infrastructure team, show an innovative intersection design.*

# About MUARC

**T**he Monash University Accident Research Centre (MUARC) is Australia's largest multi-disciplinary, injury and injury prevention research institute.

Our research spans all settings in which injury occurs – transport, the workplace, the home, and throughout recreational and other community locations.

Our research relevance and excellence have produced results that have had a significant impact upon both government and industry injury prevention efforts.

Our mission is to make a difference in safety policy, practice, and most importantly, outcomes.

MUARC conducts research of the

highest standard, creates new and improved methods and provides incisive interpretations of research findings.

The Centre identifies emerging injury problems, monitors progress, determines and evaluates solutions and advises on safety strategies.

It works cooperatively with both public and private sector organisations to define the scope of research projects and encourage the adoption of recommended injury prevention measures.

Many of MUARC's senior researchers are active at the national and international level and the Centre is regarded as one of the leading injury prevention research centres in the world.

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A world leader

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# Chair's Foreward



**Professor Edwina Cornish**  
Chair, MUARC Board  
Senior Deputy Vice-Chancellor &  
DVC, Research,  
Monash University

I am pleased to present the MUARC Annual Report for 2010, which provides strong indication of MUARC's ongoing fulfilment of the Centre's strategic aspirations.

Over MUARC's long history of development and consolidation, the Centre has earned its place as an essential part of not only the community's efforts to address the major public health problem that is injury, but also of Monash University's contribution to the global future.

MUARC continues to work with local stakeholders to address local issues in each of the regions in which Monash has campuses, and in doing so has made a truly international contribution to knowledge as a leader in the field.

A major highlight of this 2010 report is the extent to which MUARC has been able to respond to the challenge that now confronts all university research centres, to strengthen both academic performance and community relevance. Over the past few years, MUARC has pursued initiatives that have enabled the Centre to respond to this challenge, and in 2010 MUARC's performance is clearly showing the results.

Increased training for existing staff, enhanced by the international experience of several new appointments, has enabled MUARC to dramatically increase its publication and competitive grant success. MUARC has always had strong project management capability, but in 2010, new training, new tools and new emphasis on project management have combined to achieve an increased professionalism of the MUARC research workforce.

A dramatically increased PhD completion rate was evident in 2010 compared to previous years, and projections for the next two years suggest this increased rate will continue into the foreseeable future. 2010 also saw further development of our driving simulators and instrumented vehicles that form an important part of MUARC's world-class infrastructure for injury prevention research.

This year also saw the maturing of MUARC's restructuring of its research staff, from static 'research groups' into dynamic project-based research teams that form and reform as needed around new projects and specific problems. In 2010 these project-based teams seamlessly operated across the Centre, and in many instances comprised academics drawn from across Monash faculties. This dynamic structure and function demonstrated the advantages and feasibility of developing a whole of Monash approach to research in this field.

This new operational model also supported the establishment within MUARC of a specific focus on the development of research partnerships to support the translation of MUARC research to population level policies and programs.

In 2010, MUARC actualised the notion of Injury as an area of Monash strength and focus. We look forward to performance outlined in this 2010 report being just the start of substantial escalation in injury research capacity at Monash University that will be further demonstrated in the reports to follow in future years.

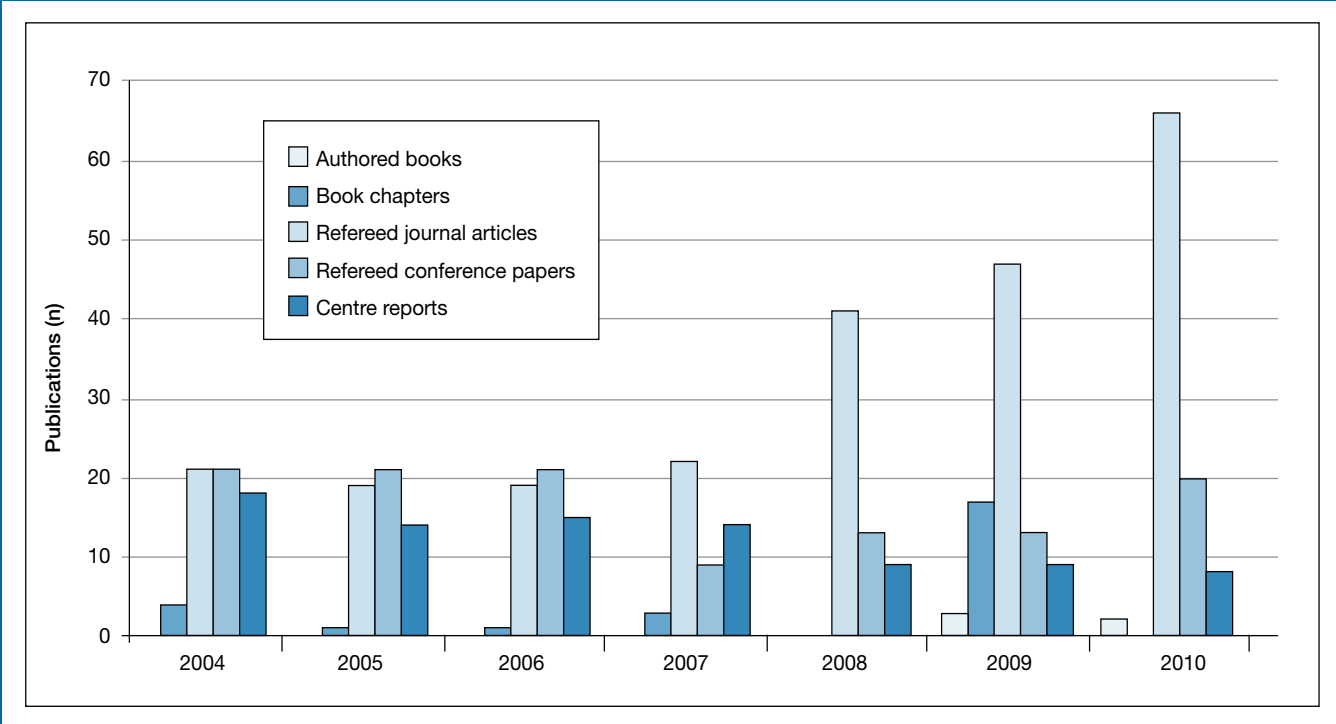


Table 1: Monash University Accident Research Centre publications by type, 2004-2010.

# Director's Report



**Professor Rod McClure**  
MBBS BA PhD FAFPHM FAICD  
Director

Universities throughout the ages have made their contribution to society in terms of research, education and service. Over its 24 years as a University-based research centre, MUARC has developed an enviable reputation for excellence in all these areas. Through high-standard research and independent recommendations, we have challenged and supported the community, governments and industries to eliminate serious health losses due to injury.

The cumulative efforts of our 24-year history were evident in 2010 through escalating indicators of our contribution to society. The principle indicators of MUARC's contribution are the peer-reviewed documentation of our research outputs. The trends illustrated in Table 1 indicate dramatic increase in MUARC's contribution to knowledge over recent years. That 45% of our publications in scientific journals in 2010 were in ERA A and A\* journals indicates the quality of this contribution.

MUARC's growing academic professionalism means we are a preferred centre for the leading injury prevention and transport safety researchers. In 2010 MUARC welcomed two of Australia's leading injury professors to the University. Two of our early career researchers were accepted into the Monash Research Accelerator Program, which recognises, rewards and accelerates the careers of Monash University's highest performing early career researchers. One of our researchers was awarded an NHMRC Training Fellowship. In 2010 MUARC had 21 students enrolled, with six graduating during the year.

In 2010, the funds MUARC received both from Government contracts and from National Competitive grants has doubled since our 2004 income

from these sources. In particular the development, maturation and depth of our engagement with stakeholders was demonstrated in 2010 by the start of two Australian Research Council Linkage Grants (Management older driver safe mobility, Application of contemporary systems-based methods to reduce trauma at rail level crossings) and two National Health and Medical Research Council Partnership Projects (Reducing falls among older people in Victoria, National guidance for Australian football partnerships and safety) and the award of two further Linkage Grants for commencement in 2011 (Managing increasing challenges in motorcycle safety, Understanding and preventing injury in the Australian led outdoor activity domain).

Without doubt the reason for the MUARC success lies with the people who work here. MUARC staff are talented professionals who strive for nothing short of excellence and who are committed to making a difference to the community they serve. The MUARC team work together in a collaborative spirit and with a shared determination rarely found in the competitive academic environment. With the support of Monash University, our stakeholders, and the community, 2010 has been extraordinarily successful for MUARC by all benchmarks against which we have been judged.

In 2011, MUARC undergoes its quinquennial review. The review will examine where we have been, how we got here, and most importantly it will set our direction for the next five years. It has been a privilege being a part of the MUARC leadership team. It is a team that has had superb support from all the MUARC staff. Thank you all for your ongoing contribution to the MUARC goals and we look forward to whatever 2011 will bring.

# Directorate

## Director

### Professor Rod McClure

MBBS BA PhD FAFPHM FAICD



Throughout 2010, Rod McClure maintained an active research program across the injury continuum. His scientific publications and presentations for 2010 reflect this activity.

## Associate Director

### (Education and Research Training)

### Dr. Judith Charlton

PhD, MSc, BEd, MAPS



Dr. Judith Charlton is Associate Director (Education and Research Training) with responsibility to develop the postgraduate training activities of the

Centre. She leads the Behavioural Safety Science Team. Full details of her team's research program start on page 12.

## Deputy Director

### Dr. Lesley Day

PhD, MPH, BSc(Hons)



Dr. Lesley Day is the Deputy Director with responsibility to encourage research excellence throughout the Centre. She co-leads the Injury Surveillance and

Epidemiology Team. Full details of her team's research program start on page 29.

## Professor Max Cameron

PhD, MSc, BSc

### Adjunct Professor



Appointed as a Professor in December 2007, Max Cameron continued part-time in this role during 2010. He is an advisor and mentor for staff, particularly

in the Injury Analysis and Data Team. He

## C-MARC Curtin Monash Accident Research Centre

CMARC was established in late 2008-early 2009 as a partnership between Curtin University of Technology (Western Australia) and Monash University supported by the State of Western Australia. The Centre's activities include:

- Investigation of, and research into, the causes of road crashes and resulting injuries in Western Australia.
- Identification and evaluation of existing and potential, measures in Australia and world-wide to prevent road crashes and resulting injury.
- Development of data and research findings on road crashes and their causes.
- Development of road safety strategies.
- Making recommendations to the State and its agencies in connection to road safety.
- Making public its findings and recommendations.
- Ensuring that all possible means of, and methods for, improving road safety in Western Australia are considered.

Associate Professor Brett Hughes took up his appointment as Director in 2010.



*Dr Judith Charlton, Professor Rod McClure, Dr Lesley Day and Mr Ron Smith.*

also leads and undertakes specific projects on enforcement issues, speed and alcohol management.

#### **Dr. Mike Regan**

PhD, BSc(Hons), MESA

**Senior Research Fellow (D)  
(on secondment) /Research Director,  
INRETS France**



Dr. Mike Regan is on a four-year secondment from MUARC as a Research Director with the French National Institute for Transport and Safety

Research (INRETS) in Lyon, France. He is affiliated with two of INRETS' laboratories – the Laboratory for Ergonomics and Cognitive Sciences Applied to Transport (LESCOT) in Lyon, and the Modelling, Simulations and Simulators (MSIS) laboratory in Paris. The aims of Mike's secondment are to:

- support INRETS/MUARC involvement in EU-funded FP7 projects
- identify, initiate and undertake new collaborative research activities, and
- facilitate broader, enduring collaborations between INRETS, MUARC and other research institutes.

Mike was awarded the 2009 Cumming Memorial Medal by the Human Factors and Ergonomics Society of Australia for "highly esteemed human factors and ergonomics-related research or application in a relevant area of human factors and ergonomics".

#### **Emeritus Professor Tom Triggs**

PhD, MEngSci, BE, BSc

##### **Emeritus Professor**



Emeritus Professor Tom Triggs continued his association with the Centre and its Human Factors Group in 2010. He continued as a member of the VicRoads New Driver Licensing program. Tom is Chair of the Board of Management for the Victorian Problem Gambling Research and Treatment Centre, and is a member of the Research Degrees Committee of the Monash School of Psychology, Psychiatry and Psychological Medicine. Tom is involved in the supervision of MUARC PhD students.



#### **Professor Ian Johnston**

AM, PhD, BA (Hons), FTSE

##### **Adjunct Professor**



#### **Professor Claes Tingvall**

DrMedSci, MSc

##### **Adjunct Professor, Global Road Safety Research**



#### **Professor Peter Vulcan**

AM Deng(honoris causa), PhD, MSEM, MechE, BA

##### **Honorary Professor**

#### **Administration staff**



**Lorraine Atkinson**  
HR Officer



**Odette Barrie**  
Exec. Assistant to  
Director



**Glenda Cairns**  
Senior Admin. Officer/  
Webmaster



**Christine Chesterman**  
Dip.Hol.Kin  
Finance Administration  
Officer



**Noelene Deveson**  
Senior Project Officer



**Kitie Douanghoutha**  
Computer support



**Brenda Gibson**  
BA, DipEd, PGradDip-History  
Senior HR Advisor



**Ron Smith** BA, DipEd  
Chief Operating Officer



**David Stroud** GradDip  
Computer Systems  
Engineering, BEng  
Computer Systems  
Officer



# Australian Centre for Research into Injury in Sport (ACRISP)

The term 'sports injury' covers the full spectrum of injury that occurs to people during sport, physical activity or active recreation, whether they be elite athletes, community sport or leisure participants. This new major research program area is concerned with the distribution and determinants of sports injury, evaluation of intervention strategies to prevent these injuries and the translation of this knowledge to real-world safety behaviours.

While some limited research has been conducted in this area at MUARC, this became a major research strength with the arrival of Professor Finch and her team in October 2010. Accordingly, the Australian Centre for Research into Injury in Sport and its Prevention (ACRISP) is now a recognised research grouping at Monash University.



**Team Leader**  
**Professor Caroline Finch**  
ASTAT, PhD, MSc, BSc(Hons).  
NHMRC Principal Research Fellow (Oct-Dec)



**Dr. Peta White** PhD, BA (Hons), BEd, DipTeach  
Research Fellow (Oct-Dec)



**Dr. Alex Donaldson**  
DHSc, MSc, Bed, DipT  
Research Fellow (Oct-Dec)



**Peter Richardson**  
BAppSc, Dip Acu, BApSc (Hons)  
PhD student (Oct-Dec)

## Expertise

The multi-disciplinary research team has qualifications and specialist training in biostatistics, behavioural psychology, epidemiology, health promotion and physiotherapy. Collectively, the team has expertise in injury coding, classification and data systems, behavioural theory, ecological models for injury prevention, controlled trials of intervention efficacy and effectiveness; understanding barriers and motivators towards the uptake of prevention measures; implementation research; and statistical modelling. The team fosters strong collaborative links with researchers from other parts of Monash University (such as the School of Physiotherapy and the Department of Epidemiology and Preventive Medicine) and other universities including University of Melbourne, University of New South Wales, Latrobe University and the University of Ballarat.

## Resources

National and international competitive research funding funds the ACRISP team's in-house and collaborative research. A National Health and Medical Research Council Principal Research Fellowship supports Professor Finch and the NHMRC funds a number of projects. The team receives infrastructure support from the International Olympic Committee (IOC) through its designation as only one of four international IOC Centres for Research into the Prevention of Injury and Protection of Athlete Health.

## Highlights

The transfer of several collaborative research grants previously held by Professor Finch supported the establishment of ACRISP in October 2010, and the project work will now be completed at MUARC.

### IOC Centre for Research into the Prevention of Injury and Protection of Athlete Health

Following an international review, the ACRISP team led by Professor Finch was supported as one of only four international IOC Centres for Research into the Prevention of Injury and Protection of Athlete Health. The other centres are in Norway, Canada and South Africa. The team is led by

Professor Finch and includes Professor Jill Cook (Monash School of Physiotherapy) and A/Professor Paul McCrory and A/Professor Andrew McIntosh from the University of Melbourne. Research outputs are expected from 2011.

### The National Guidance for Australian Football Partnerships and Safety (NoGAPS) project

This project is funded by an NHMRC Partnerships Project Grant with additional support (both cash and in-kind) from several project partner agencies: the Australian Football League; Victorian Health Promotion Foundation; NSW Sporting Injuries Committee; JLT Sport, a division of Jardine Lloyd Thompson Australia Pty Ltd; Department of Planning and Community Development – Sport and Recreation Victoria Division; and Sports Medicine Australia - National and Victorian Branches. The project aims to identify factors that influence the translation of evidence-based injury prevention interventions into practice in community sport, and to provide specific evidence for the effectiveness of an evidence-based exercise-training program for lower limb injury prevention in community Australian Football.

### Training loads and injury risk in elite athletes

This project is in collaboration with the Department of Physical Therapies & Applied Research at the Australian Institute of Sport. It involves data linkage of several databases so that injury events and their treatment and other outcomes are matched to both baseline profiles of the musculoskeletal, psychological and training profiles of elite athletes. Analysis of linked data will identify predictors of injury occurrence and adverse outcomes of those injuries.

### The Preventing Australian Football Injuries through exercise (PAFIX) study.

This NHMRC-funded project is a randomised controlled evaluation of the effectiveness of an exercise training intervention for the prevention of lower limb injuries in community Australian football players. Work in late 2010 involved database management and statistical analysis of the data will be undertaken in 2011.

### Making a difference in sports safety: a pilot study in applying a theory informed approach to the diffusion of safety initiatives in community level sport.

Funded by the NSW Sporting Injuries Committee and conducted with the University of NSW and the Australian Rugby Union (ARU), this research is exploring ways of improving the adoption and implementation of safety policies and practices in community sport. It will develop, implement and evaluate the impact on community rugby union coaches of a theory-informed dissemination plan for the Mayday Safety Procedure – an ARU neck and spinal injury prevention intervention. A survey of knowledge and practice of coaches of senior community rugby teams in five zones/associations in NSW took place at the end of the 2010 season. The project team is developing a Mayday Safety Procedure dissemination plan informed by the Diffusion of Innovations theory, which the ARU development officers will implement in one association during the 2011 season. Process and outcome evaluation of the theory-informed dissemination plan will be conducted later in 2011.

## Staff Members of Boards and Committees

- British Journal of Sports Medicine, Editorial Board (C. Finch)
- Injury Prevention, Editorial Board (C. Finch)
- International Journal of Injury Control and Safety Promotion, Editorial Board (C. Finch)
- Journal of Science and Medicine in Sport, Editorial Board (C. Finch)
- Sports Medicine Australia Victorian Branch Board member (P. White)

## Presentations

Finch C. *Epidemiology of sports injuries in Australia*. 4th Clinical Sports Medicine Conference. Cape Town, South Africa, 13 – 15 October 2010. [Invited Keynote Address]

Finch C. *A prospective cohort study of injuries in junior club cricketers as well as their injury risk perceptions*. 4th Clinical Sports Medicine Conference. Cape Town, South Africa, 13 – 15 October 2010. [Invited Keynote Address]

# Behavioural Safety Science

**T**he research activity of the Behavioural Safety Science team focuses on understanding and managing human behaviour to meet the challenge of preventing injury and improving safety. Under the leadership of Senior Research Fellow Dr Jude Charlton, the team's research priorities centre on the vulnerable road user and particularly the safety of seniors, youth and children as vehicle occupants, pedestrians, cyclists and drivers. It is estimated that about 90 per cent of crashes involve road user variables and the team's research can make a major contribution to reducing road crashes and injury severity. A significant feature of the team's activity is the safe transportation and mobility of the ageing population and those with impairments that impact on their safety as road users. A variety of research methods and technologies are used including driving simulation, instrumented vehicles and real-world observation, survey and interview techniques and mass data analysis.

## Expertise

The team's disciplinary expertise includes psychology, applied health sciences, epidemiology, education and social sciences. Their research also draws on strong links with engineering, neuroscience and gerontology researchers and students at MUARC as well as in other faculties and institutions. The team brings a multidisciplinary perspective to the scientific study of road user safety. The researchers actively engage with government, industry and professional groups in the local community, nationally and globally through project activities as highlighted in the projects described below.

## Resources

### Simulation Research

The team employs the MUARC instrumented vehicle fleet as well as the MUARC advanced driving simulator and portable simulator laboratories in much of its research. The team draws upon multidisciplinary expertise in behavioural, engineering, human factors and cognitive neurosciences within the Centre, as well through its links with Monash faculties and internationally.

The team has generated a range of simulated driving environments for different experimental needs including different road types, traffic and signage, intersection signal controls, and light and weather conditions. The portable simulator offers a unique capacity for off-campus research and is easily transported to community and clinical settings. The simulator offers a very safe and efficient method of collecting information on how drivers behave in challenging traffic situations and provides collision and near-collision data that cannot easily be observed in the real world. Using evidence from crash data, experimental traffic scenarios are skilfully designed to simulate real world driving situations which pose a significant challenge for seniors or other groups of interest such as drivers with early dementia, Parkinson's disease and vision impairments.

**Simulator validation:** A critical question in simulation research is the extent to which the simulator elicits the same driving behaviours that occur

when driving in the real world – called behavioural validity. This research compares performance of drivers in simulators with their performance in instrumented vehicles under similar traffic/road conditions. This is important for simulator acceptance and credibility, and is vital when simulator performance influences real world outcomes, such as designing roads and road signs and making decisions about fitness to drive.

MUARC's reputation in simulator validation work is highly regarded and the team has contributed an invited chapter on this topic in a significant driving simulation book to be published in 2011.

**Pedestrian simulation:** The team has extensive experience in applying simulation techniques in other road user settings including evaluation of pedestrian behaviour. Recent work also includes the development of a successful training package to teach children to select safe gaps in traffic when crossing roads.

### Instrumented cars, naturalistic driving and road user observation methods

For many research questions, it is important to make real-world observations of drivers, cyclists and pedestrians. These studies use covert monitoring of behaviour with various technologies including:

- sophisticated instrumented vehicles equipped with cameras, eye-tracking equipment and data acquisition units which monitor speed, braking and steering;
- in-vehicle camera systems to study child passenger out-of-position status and driver distraction;
- fixed cameras to study cyclist and driver behaviour at intersections;
- bicycle helmet-mounted cameras to study cyclist-driver behaviour on designated cycling routes.

Using these techniques, the team has gathered a rich data bank of behavioural and vehicle-based information. The team is rapidly expanding capabilities in this area and has recently completed world leading research using naturalistic driving methods to evaluate seniors' intersection driving, cyclists' red-light running, and child car occupants' out-of-position status in child restraints.

## Highlights and Outputs

2010 was a productive year for the team. Efforts were invested in grant writing in the November 2010 ARC Linkage grant round to expand our work in safety of children in cars. The fruits of these efforts will be known in early 2011. The team also secured a large-scale grant from the Victorian Neurotrauma Initiative and Ontario Neurotrauma Foundation collaborative funding scheme. This grant will support the 'Safer roads to recovery: Assessing readiness for driving after traumatic brain injury project'.

In addition to her role of managing the Behavioural Safety Science Team's research activities, Dr. Jude Charlton contributed to the Centre's education and training as Associate Director (Education and Research Training) and supervised six PhDs and two honours students. Jude also presented on child safety and older driver issues at the four international conferences and symposia including the Association for Advancement of Automotive Medicine 54th Annual Scientific Meeting in Las Vegas, and invited presentations at the Virginia Tech Transportation Institute's naturalistic driving symposium; the CHDI Huntington's disease driving forum in Los Angeles; and at Lakehead University, Thunder Bay, Canada.

Jim Langford continued to work mainly in the older driver area. In addition to his continued participation in the Ozcandrive older driver cohort study, he was a senior investigator on several research projects for Austroads, VicRoads and the New Zealand Transport Agency. Jim also continued his work with the Curtin-Monash Accident Research Centre, preparing reports and papers on several aspects of Western Australia's Towards Zero safe system strategy. He made two overseas presentations during the course of the year: a peer-reviewed paper on older drivers in crashes – identifying the safest vehicles; and occupant protection technologies at the 20th Canadian Multidisciplinary Road Safety Conference; and Australia's Safe System Approach at Lakehead University, Thunder Bay, Canada.

Dr Jennie Oxley contributes to research activities as a significant member of the team, through her supervision of postgraduate students ▶



*Dr Jude Charlton presents on the Auto CRC Older Driver project at a Monash event.*

Marilyn Johnson, Roszalina Ramli and Kelly Bryden. Jennie also continues to play a leading role internationally in older driver research through her activities as co-chair of the United States Transportation Research Board (TRB) Sub-committee on Enhancing Older Women’s Safe Mobility. At the same time, Jennie maintains her primary role in advancing injury prevention research activities in Malaysia and throughout the region, as Associate Director of MUARC Malaysia in Kuala Lumpur.

The team’s achievements included the completion of a major report on medical conditions and driving (MUARC Report 300), commissioned by VicRoads. This research has informed the recent revisions of the Austroads Fitness to Drive guidelines and resulted in an invited presentation by Jude Charlton at the 5th International Fit to Drive, Traffic Expert Congress in The Hague in 2011. The team also contributed to major projects in the young driver area for Queensland Transport and VicRoads.

An important feature of the team’s work is knowledge translation, achieved through scientific publications and conference presentations, including nine peer reviewed journal papers. Team researchers also communicated their scientific findings through seminars and workshops to the motor vehicle industry and health practitioners; presentations to teachers and parents; and regular communication with relevant State and Federal government departments.

Older drivers, children, novice drivers and cyclists featured as hot topics in the print and electronic media through the year for which the team were called upon for comment and feature articles.

Joining the team this year were Psychology Honours students Zafiroula (Zeffie) Vlahodimitrakou and Matthew Catchlove. Zeffie undertook her thesis with the Ozcandrive project, developing and validating a new driving observation tool while Matthew studied naturalistic driving data in an investigation of older driver distraction. The team’s

PhD students also contributed to the research activities in vulnerable road user behaviour: Hafez Alavi (pedestrian safety), Lisa Molnar (older driver self regulation), Marilyn Johnson (cycling safety), Carlyn Muir (vision impairment and driving) Kelly Bryden (dementia and driving) and Karen Scally (Parkinson’s disease and driving).

Undergraduate Vacation Research Scholar Emma Owen, a third year Monash University Psychology student, joined the team during the 2010-11 summer break. Working with Dr Sjaan Koppel and Lorraine Atkinson, Emma gained some interesting insights into life as a scientist as she assisted in a range of research activities with the Ozcandrive project. Her experiences also provide an opportunity for the Centre to contribute to the development of the next generation of researchers. Junran Joiner and Jason Manakis from Monash Aeronautical Engineering also joined the team for their practicum placements, providing valuable technical support for the Ozcandrive Project.

## Research highlights 2010

### Older drivers

With the baby boomer cohort about to enter old age, there is an urgent need to understand more about the next wave of older road users and how to effectively manage their safe mobility. The team’s research centres around three broad research questions

- How do we identify at-risk older drivers?
- What are the most effective solutions for managing at-risk older drivers?
- What is the full societal impact of reducing/stopping driving on the mobility, health and economic well being of older drivers?

The following highlights a significant program of work addressing older driver safety:



**Team Leader:**  
**Dr. Judith Charlton**  
PhD, MSc, BEd, MAPS  
Senior Research  
Fellow (D)  
& Associate Director  
(Education &  
Research Training)



**Dr. Sjaanie Koppel**  
PhD, BAppSc(Hons), BA ARC  
Post Doctoral Fellow (C)



**Jim Langford**  
MEdSt, BA(Hons) Senior  
Research Fellow (C)



**Dr. Jennie Oxley**  
PhD, BSc(Hons) Senior  
Research Fellow (C)

### Successful ARC Linkage Grant: Ozcandrive

In 2010, our team commenced work on the ARC linkage grant, *Ozcandrive*, which broadly aims to reduce vehicle-related injuries and deaths and improve the quality of life of older Australian and New Zealand drivers by extending their safe mobility. Using a longitudinal study design, the project will track a cohort of drivers (n = 300) in collaboration with a parallel study involving seven research centres throughout Canada (n = 1,000) for five years, assessing changes in their functional abilities, driving patterns and driving performance. The project is a collaboration between MUARC, Monash University Department of Medicine, La Trobe University, the University of Ottawa, Canada, VicRoads, the Victorian Department of Justice (DOJ), the Victorian Transport Accident Commission (TAC), the New Zealand Road Safety Trust and Eastern Health.

The project team has made significant achievements throughout 2010:

- Investigator Sjaan Koppel travelled to Ottawa, Canada for project training, and investigators Jude Charlton and Jim Langford travelled to Ottawa for the annual Candrive project meeting with international collaborators.
- New staff members joined the Ozcandrive team, including Project Manager Lorraine Atkinson, Research Associates Louise Beasley and Elizabeth Jacobs (who conduct participant assessments in Melbourne) and Research Associates Kate Mora and Abigail Harding (who conduct the participant assessments in Wellington, New Zealand), and Duncan Joiner and Jason Manakis (who install the In-Car Recording Devices in participants' vehicles).
- Mrs de Kretser launched the Ozcandrive Project in October at the Peter James Centre.
- Participant assessments commenced in June in Australia and in October in New Zealand.



*Mrs Jan de Kretser (centre front) and Ozcandrive participants Frances Barrett (front right) and Evan Hughes (far right); Team and guests: from left, David Plunkett, Acting CEO, Eastern Health, Chief Investigators Dr Jude Charlton and Prof. Peteris Darzins, Dr Sjaan Koppel and Dr Marilyn Di Stefano, and Professor Ian Johnson (former Director, MUARC).*

- Pilot study for the On-road Driving Observation was completed by Zefi Vlahodimitrakou as part of her Honours degree (achieved H1).
- Hosted several Candrive team visitors, including Holly Tuokko (CI on Candrive) from University of Victoria and Glenys Smith (RA) from University of Winnipeg.

#### Postdoctoral Fellowship to study safe mobility of seniors

In 2010, Dr Sjaan Koppel was awarded an Australian Research Council Australian Postdoctoral Fellowship – Industry (APDI). The APDI is part of the five-year older driver cohort study (ARC linkage project Ozcandrive). As part of her Postdoctoral Fellowship, Sjaan will develop a parallel research program to improve the quality of life of older Australians following driving cessation. She will identify the key factors associated with psychological wellbeing following driving cessation and develop

a set of evidence-based guidelines so licensing authorities and healthcare professionals can assist older adults and their families in preventing or alleviating negative consequences, while assisting in a healthier transition from older driver to non-driver.

#### Children in cars:

##### What children are really doing in the rear seat of cars and are they a source of distraction in the vehicle

Child restraints systems (CRS) for vehicles are designed to provide specialised protection for child occupants in the event of a crash. However, children do not sit perfectly still and upright while travelling in vehicles, potentially leading to inappropriate seating positions throughout their journey. This behaviour may compromise the safety benefits associated with CRS and may distract the driver from the driving task and therefore affect driving performance. ▶



**Megan Bohensky**  
MPH, BA  
Research Fellow



**Michelle Scully**  
BBSc(Hons), BMus  
Research Fellow



**Lorraine Atkinson**  
Ozcandrive Project  
Administrative Manager



**Louise Beasley**  
Ozcandrive  
Research Associate



**Elizabeth Jacobs**  
Ozcandrive  
Research Associate

In a world-first study, this project trialed a naturalistic, observational approach to examine how children are restrained and seated in their CRS while travelling in their car. The study was funded through the AutoCRC in partnership with GM Holden. Families with children aged between one and eight years old drove an instrumented ‘study vehicle’ on their regular trips for three weeks. All children used their regular CRS. A discrete video recording system in the vehicle provided images of the driver and front seat passenger, the rear seat child passengers and the traffic ahead.

The video-recordings inside and outside the vehicle were analysed to examine the children’s behavior in their CRS and identify potential distracting activities, where ‘distraction’ was broadly defined as any secondary activity that competed for the driver’s attention while driving. Analyses revealed that children were out-of-position, and hence likely to be sub-optimally restrained, for around 70 percent of the time during trip and 12 percent of all distracting activities were child-occupant related (e.g., turning to look at the rear seated occupants, engaging in conversation with their children, passing food and drink and playing with their children). The findings from this study highlight the need to raise awareness amongst parents that sub-optimal restraint use has serious implications for their child’s protection in the event of a crash, and about the potential crash and injury risks when distracted by their children. The preliminary research resulted in two publications.

In 2010, MUARC senior researchers Drs Jude Charlton, Sjaan Koppel and Missy Rudin-Brown (Human Factors) assembled an international team of researchers to expand the child safety research program. The collaboration has brought together researchers from MUARC, the Children’s Hospital of Philadelphia Research Institute, University of Michigan Transportation



*Research shows that children in restraints do not sit perfectly still and upright while travelling, meaning they are at greater risk in a crash.*

Research Institute and Chalmers University of Technology. In May, the team hosted a successful round table with key stakeholders from government, the motor vehicle and child seat industries to discuss the ‘big issues’ in child safety in cars, and to map out a broad plan for future research to address these issues. These efforts culminated in the submission of major grant application to the November round of the ARC linkage scheme. Outcomes will be used to optimise vehicle and CRS design and develop targeted safety education

strategies to mitigate injury to children in car crashes.

**Medical conditions and driving**

In 2009, VicRoads commissioned an update of the significant 2004 report on ‘The Influence of chronic illness on crash involvement of motor vehicle drivers’ (MUARC Report 213). This research involved a comprehensive, systematic review of medical conditions and crash risk.

The second edition report (MUARC Report 300), released in 2010, reviews



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the literature pertaining to the influence of chronic illness and impairments on crash involvement and provides an updated review of evidence since the first edition. A risk rating system was applied to all medical conditions of interest. This provided a means of identifying those conditions that presented the greatest risk. Based on both new evidence and evidence cited in the 2004 report, eight conditions were found to have at least a moderately elevated risk of crash involvement (relative risk greater than 2.0) compared with the relevant control group: alcohol abuse and dependence, dementia, epilepsy, multiple sclerosis, psychiatric disorders (considered as a group), schizophrenia, sleep apnoea and cataracts. Guidelines regarding fitness to drive from selected jurisdictions were also considered in the light of evidence for crash risk. These comparisons revealed a number of differences across the jurisdictions and highlighted some inconsistencies with the available evidence for crash risk. Recommendations were made for managing the risk of injury crashes associated with medical conditions. The findings of this review also highlighted the need for a cooperative international approach to future research using population based, prospective studies to advance scientific knowledge linking impairment from medical conditions and crash risk.

The two reports have led to four invited international presentations and have been widely cited by Australian, US and European road safety authorities for medical review and licensing decisions.

#### Return to driving following Traumatic Brain Injury

More than two-thirds of persons with a traumatic brain injury (TBI) return to driving. Despite this, limited research investigating driving performance following TBI has been conducted. In 2010, Dr Jude Charlton and colleagues from Monash School of Psychology, the

Epworth Hospital, Lakehead University and the University of Ottawa formed a collaboration to examine the nature and causes of driving difficulties following TBI as a basis for developing more reliable and valid assessment procedures for readiness to return to driving.

Supported by the Victorian Neurotrauma Initiative, the project will run for two years across three sites in Melbourne, Thunder Bay and Ottawa, and will study driving performance of young drivers with brain injury in simulated, on-road and naturalistic driving conditions. Findings from this study will significantly contribute to evidence for rehabilitation clinicians assessing driver readiness. This research will guide the development of more sensitive driving evaluation procedures and driver retraining programs, thereby contributing to improved safety and mobility for those with TBI who return to driving.

#### Staff membership of Boards and Committees

- Amy Gillett, Foundation, Road Safety Advisory Committee (M. Johnson)
- Association for the Advancement of Automotive Medicine, Chicago, Illinois, Scientific Program Committee, Member (J. Charlton, J. Oxley)
- Association for the Advancement of Automotive Medicine, Membership and Credentials Committee (J. Charlton)
- Australasian College of Road Safety (Victorian Chapter) Committee, (J. Charlton, J. Oxley)
- BrainLink, Board of Directors (J. Charlton)
- Monash University Clayton Bicycle Strategy Steering Group, (M. Johnson)
- Monash University Human Research Ethics Committee (MUHREC), Management Committee (M. Johnson)
- US Transportation Research Board (TRB) Sub-committee on Driver Medical Review (J. Charlton)
- US Transportation Research Board (TRB) Sub-committee Enhancing Older Women's Safe Mobility (Co-chair: J. Oxley)
- International Advisory Panel, Institute for Mobility, Activity, and Participation (I-MAP) College of Public Health and Health Professions, University of Florida, USA (J. Charlton)
- Scientific Committee, International Conference (Elsevier) on Aging, Mobility and Quality of Life (AMQoL) (J. Charlton)



**Emma Owen**  
2010 Vacation  
Research Scholar



*The Behavioural Safety Science team.*



# Human Factors

**H**uman Factors is concerned with the application of what we know about people, their abilities, characteristics, and limitations to the design of equipment they use, environments in which they function, and jobs they perform. The Human Factors team applies models of system safety to the analysis of transportation and other safety-related issues to provide robust research outputs and policy guidance for our stakeholders and clients. Team members have backgrounds in experimental psychology, human factors, ergonomics, computer science, epidemiology, biomedical engineering, sports science, military/defence, and road safety policy.



*The team is researching environmental and infrastructure factors that influence safety at level crossings.*



**Team Leader**  
**Dr. Michael Lenné**  
PhD, BSc(Hons)  
Senior Research Fellow (D)



**Jessica Edquist**  
PhD, Grad Dip(Psych), BSc  
Research Fellow (A)



**Eve Mitsopoulos-Rubens** BA, BSc(Hons)  
Research Fellow

## Expertise

Sound, theoretically-based models of system safety underpin our research, which focuses on a broad range of factors that shape and constrain operator behaviour, and how task, environmental and organisational factors influence performance.

Team projects in 2010 covered the following themes:

- the road environment and its influence on speed selection and crash risk
- the safe system approach to collision investigation
- driver distraction
- road user situation awareness
- the design and evaluation of in-vehicle warning and information systems
- motorcycle conspicuity and novice rider licensing systems
- organisational influences on worker safety
- occupational safety
- safety of police vehicles
- perceptions and attitudes towards testing for alcohol and other drugs (AOD) in the aviation industry
- human factors and the safety of outdoor activities.

## Resources

The team uses a variety of methods to support projects, including on-road testing, simulation, surveys, focus groups, structured interviews, stakeholder consultation, and human factors methods such as task and cognitive task analysis, and interface and usability assessment. While the MUARC suite of driving simulators (advanced, portable, and desk top varieties) continue to be the primary research platforms used by the team, the recent acquisition of on-road test vehicles has provided team members with the means to measure driver performance in naturalistic settings.

- **The MUARC OrTeV (On-Road Test Vehicle)** is a state-of-the-art mobile data acquisition system installed in a 2008 GM Holden VE Commodore sedan. Developed in conjunction with the Cooperative Research Centre for Advanced Automotive Technology (AutoCRC), OrTeV collects data for both controlled and naturalistic studies. Vehicle, driver and eye tracking data are

recorded via a sophisticated network of sensors and computers, while unobtrusive cameras record forward, peripheral, and rearward views of the road scene, and interior views of the driver and controls. A combined lane position and headway detection system has recently been implemented.

- **The MUARC advanced driving simulator** consists of a 2009 GM Holden VE Commodore sedan mounted on a three degrees-of-freedom motion base platform, with a curved projection screen providing a 180° horizontal and 40° vertical field-of-view. Forward vision is produced by three image generators using seamless blended projection onto a cylindrical screen, while a separate projection screen at the rear of the vehicle provides rear vision. Collection of driver performance and eye-tracking data is accomplished via a network of sensors and computers.
- **The MUARC portable simulator** is one of the world's most advanced portable PC-based driving simulators, featuring three forward scene LCD monitors, an adjustable vehicle seat, pedal assembly, dashboard and steering wheel. The simulator uses state-of-the-art 3D visuals creating an exceptionally detailed driving scene that can replicate the full range of driving conditions.
- **The desktop simulator** is a low-fidelity, PC-based system equipped with three 17-inch LCD monitors, a computer gaming steering wheel and brakes. It is well suited to methodologies that assess the driver distraction associated with performing in-vehicle tasks while driving, such as the lane-change test (LCT).

## Highlights and Outcomes

In 2010 the team continued to refine its road safety human factors program while also engaging in research in other areas of transportation (rail level crossings and aviation).

### Simulation and on-road testing

#### *Level crossing research*

Collisions between trains and vehicles at rail level crossings represent a significant issue that has safety, efficiency, and economic implications for the road and rail networks in Australia. Mike Lenné,

Paul Salmon and Tom Triggs received \$560,000 over four years from the Australian Research Council for a study on level crossing safety which is supported by Victoria's key rail safety stakeholders including VicTrack, Public Transport Safety Victoria, Department of Transport Victoria, Transport Accident Commission, VicRoads, and V/Line. The team's research aims to provide an in-depth understanding of the road user, environmental and infrastructure-related factors that influence safety and performance at rail level crossings. Findings will be used to develop a world-first model of the level crossing system needed to develop innovative countermeasures that will improve safety.

### *The nature of errors made by drivers*

Although often implicated in road traffic crashes, driver error remains poorly understood, particularly so the role of wider road system failures (e.g. poor roadway design, infrastructure failures) in error causation. The Austroads Safety Taskforce, under their Strategic Research Program, engaged the Human Factors team to investigate the different errors that drivers make during everyday driving. Using MUARC's advanced On-Road Test Vehicle (ORTEV), the project conducted an on-road study of driving errors in which 25 participants drove a pre-determined 21km urban route whilst their behaviour was recorded using methods including observation, verbal protocol analysis, FaceLAB eye tracking, and various driving performance measures. The study found that participants made a range of errors, which were subsequently categorised into 39 specific error types. In-depth analysis of a sub-set of the driver errors demonstrated that driver errors have various causes, including contributions from the wider road 'system' such as unclear road rules and regulations and poor infrastructure and roadway design. Countermeasures designed to eradicate the driving errors identified were proposed.

### **Driver distraction and technology design**

In 2010, the team continued to provide research and policy advice to the Victorian Road Authority, VicRoads, and other road safety stakeholders on issues related to driver distraction. This involved conducting literature reviews and identifying key research and policy needs in various distraction-related areas including the

use of visual display units, driver assistance systems and outdoor advertising.

### **Distraction in Tunnels**

A key initiative in 2010 was the international collaborative Distraction in Tunnels project. The Swedish National Road and Transport Research Institute (VTI), the Swedish Transport Administration (STA), and MUARC joined forces to conduct a collaborative project exploring the effects of driver distraction from text-messaging on tunnel driving. With planning and design of the 18km Stockholm Bypass tunnel in Sweden ongoing, and because of the potentially devastating consequences of crashes in long tunnels, it was considered critical that the effects of driver distraction in tunnel environments be investigated. Using the MUARC advanced driving simulator, 24 drivers engaged in text-messaging activities while driving in a tunnel vs. on a freeway. Similar to on freeways, distraction in tunnels was found to be associated with a number of driving and visual search decrements; however, the potential consequences of these decrements in real world tunnels are expected to be significantly more serious. The study was one of the first to assess driving performance in a simulated tunnel environment, and the first to evaluate the effect of text-messaging on tunnel driving. Results will be presented at the 2nd International Conference on Driver Distraction and Inattention, in Gothenburg, Sweden in 2011.

### **Speed research**

The team was involved in several key speed-related initiatives in 2010. A simulator study conducted under the auspices of an ongoing Baseline project investigating road design factors and their interaction with speed and speed limits revealed a number of interesting effects of on-street parking in complex urban environments on driver-selected speed and crash risk. The rationale for the project, along with preliminary results, was presented at the 2010 Australasian Road Safety Research, Education, and Policing

conference in Canberra, ACT. Final results will be presented at the 2011 conference in Perth.

### **Driver training**

#### ***Review of Victoria's Graduated Licensing System (GLS) for motorcycle riders***

Graduated licensing was originally introduced as a method to address the high crash involvement of young, newly licenced car drivers. It has since emerged as a logical option for reducing the incidence of crashes among novice motorcyclists. The aim of this project was to determine how to enhance the current graduated licensing process for motorcyclists in Victoria to achieve improved road safety outcomes. The research involved four iterative stages of work. Stage 1 involved a literature review, a comparison of current rider and car driver GLS across all nine Australasian jurisdictions, and an analysis of crash data. Stage 2 involved a workshop with representatives from key stakeholder organisations and bodies, and the conduct of two focus groups with new riders. Stage 3 involved an exercise to provide a preliminary estimate of the regulatory impact of recommendations that would require legislative change were they to be implemented. Stage 4, the final stage, involved developing a prioritised list of recommendations. Based on the research, a suite of recommendations for improving the current rider GLS in Victoria was proposed, including those that encourage riders to gain more experience, those which impose restrictions on riders, and those which promote improvements in rider testing and/or training. The research formed the basis of a recent VicRoads' Discussion Paper, which set out a number of options to be considered to reduce the incidence and severity of crashes among novice motorcyclists. Based on the assumptions made on available evidence, and the preliminary assessment of impacts and costs, the range of options (increased duration of the intermediate phase, testing, training, supervision and conditions) is anticipated to result in a reduction in

motorcycle crashes by 5-10 per cent (1 to 3 lives saved and 22 to 40 serious injuries prevented).

### **Workplace safety**

#### ***Post-implementation review of the Australian aviation industry's alcohol and other drug (AOD) program:***

MUARC was engaged by the Civil Aviation Safety Authority (CASA) to conduct an independent, post-implementation review of its alcohol and other drug (AOD) program, including requirements for drug and alcohol management programs (DAMPs) and random testing. The review included three components: quantitative (on-line survey) and qualitative (focus groups) assessments of attitudes, knowledge, and behaviour of those individuals who perform safety sensitive aviation activities (SSAAs) as part of their role in the aviation community; a process evaluation of the legislative requirements, including identification of any logistical and procedural constraints experienced by a wide range of stakeholders; and a quantitative analysis of reported testing data conducted under the requirements of both DAMPs and of the CASA random testing program. The project represents the first evaluation of the effectiveness of the AOD legislation, generating a number of recommendations that, when implemented, would improve the general deterrence effect of the AOD program by making it more credible, and would help ensure that the program continues to be successful in improving the safety of aviation personnel and the larger population.

### **Safety of police vehicles**

The team began the second phase of a WorkCover NSW Research Centre of Excellence-funded research program examining police equipment and its role in injuries to police officers, which is investigating the effects of positioning of equipment within police vehicles, as well as occupant seat design, on safety and officer efficiency.



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PhD, MA, BA (Hons) Senior  
Senior Research Fellow



**Paul Salmon** PhD, MSc,  
BSc(Hons) NH&MRC  
Post doctoral Fellow (C)



**Karen Stephan**  
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**Nebojsa Tomasevic**  
MEngSc(Biomed), BEE  
Technical Manager,  
Simulation Facilities



**Margaret Trotter**  
BA(Hons)  
Research Assistant

**Human factors in the led activity domain**

The role of human factors in the led outdoor activity domain will be investigated in a project funded through an ARC-Linkage grant awarded in 2010. Industry partners include the Australia Camps Association, the Victorian Outdoor Education Association, the Outdoor Education Group, the Outdoor Council of Australia, the YMCA, Outdoor Education Australia, and the Department of Planning and Community Development Victoria. The broad aims of the project will be to develop surveillance systems required to enhance industry knowledge regarding the causes of injury causing incidents and inform the development of appropriate prevention strategies. Results will give to a paradigm shift in the way accident causation and accident data collection and analysis are viewed by outdoor activity providers in Australia.

**International collaborations**

The team continues its involvement in research with international partners, actively engaging in regular partner meetings of two European Union collaborative projects, one examining the influences of in-vehicle technologies on driver behaviour, and the other, human factors issues associated with motorcycles (the '2BeSafe' project). In the latter project, Mike Lenné became the leader of a workpackage involving 12 organisations across Europe that is examining rider attitudes and experiences with on-board technologies.

The team also developed a collaborative research program with VTI in Sweden examining driver distraction and tunnel safety. Further, the ARC-Linkage grant in level crossing safety was submitted in partnership with Prof Neville Stanton from the University of Southampton. Mike Lenné visited many European institutions to discuss collaborative research including the University of Nottingham, Brunel University, MUARC Prato, and INRETS in Paris.



*MUARC joined forces with Swedish organisations to explore the effects of driver distraction from text message on tunnel driving.*

**SWOV (The Netherlands)**

Mike Lenné spent three months at SWOV, the Dutch national institute for road safety research, in Leidschendam, The Netherlands. This staff exchange was supported through the ongoing memorandum of understanding between SWOV and MUARC, and builds upon the SWOV-MUARC collaborations and the secondment to the Centre by SWOV researcher Nicole van Nes in 2008. Most of Mike's work was focussed on naturalistic driving in two European Union Projects. For one of these, the Interaction project, his role was to finalise the implementation plan for the on-road testing of driver responses to a range of in-vehicle technologies. Mike also supported SWOV in the running of a workshop at the consortium meeting in Lyon in December to assist the nine other European partners

in executing the implementation plan. He also contributed to a second EU project, Dakota, through the examination of technology requirements for the collection of driver behaviour data in a proposed European naturalistic study. While based at SWOV Mike was also able to meet with colleagues at INRETS Paris and Lyon, the University of Nottingham, and Brunel University, to develop both existing and new collaborations.

The exchange was an invaluable professional experience and, along with MUARC colleague Nimmi Candappa who also spent time at SWOV in 2010, further cements the working relationship between the two organisations. Importantly, these visits have yield tangible project-based opportunities that will ensure that the two organisations continue to collaborate effectively.



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BAppSc(Psych)(Hons)  
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MSc, BSc  
Research Assistant

## Other Highlights

### International Conference on Applied Psychology

In July 2010 the International Conference on Applied Psychology was held in Melbourne. Mike Lenné and Tom Triggs organised a double symposium for the conference entitled Contemporary use of simulation in road safety that attracted presenters from across the globe. Presenters included Stephane Espie from INRETS (Paris), Lena Nilsson from VTI (Linköping), Sam Charlton from University of Waikato (NZ), Geoff Caird from University of Calgary, and Geoff Underwood from the University of Nottingham. Paul Salmon, Tom Triggs, and Mike Lenné from MUARC also presented during the session, while Heikki Summala was the symposium discussant. The symposia were well attended, and the written papers will appear in a special issue of Transportation Research Part F: Traffic Psychology and Behaviour in September 2011.

### NHMRC Fellowship

Paul Salmon was awarded an NHMRC post-doctoral training fellowship (public health) in 2010. This prestigious fellowship will provide support for Paul to continue his

innovative research into situation awareness and to explore its measurement and application across many areas in road transport.

### Staff membership on Boards and Committees

Staff in the Human Factors team enjoy membership on a number of national and international boards and committees. These include:

- the Human Factors and Ergonomics Societies (HFES) of Australia, Europe, and the United States (E. Mitsopoulos-Rubens, P. Salmon, M. Lenné);
- the International Organisation for Standardisation (ISO) (C. Rudin-Brown);
- the Transportation Research Board (TRB) (C. Rudin-Brown);
- the Society of Automotive Engineers (SAE) (C. Rudin-Brown);
- the Australian and European Aviation Psychology Associations (M.Lenné); and
- the International Council on Alcohol, Drugs and Traffic Safety (M. Lenné).

## Presentations

In 2010, Human Factors team members presented results from their research at many national and international conferences, including the 2010 Australasian Road Safety Research, Policing and Education conference (Canberra, ACT), the Australian Aviation Psychology Conference, and the International Conference on Applied Psychology. Several presentations that were not associated with peer-reviewed publications included the following.

- Edquist, J. Advertising on the roadsides: Driver distraction. Invited presentation to VicRoads workshop on Urban Design strategy, Melbourne, Victoria, 19 & 26 May.
- Edquist, J. Road-rail level crossings: expectations and behaviour, 2010 International Conference of Applied Psychology, Melbourne, VIC, 13 July.
- Lenné, M. Human factors research at MUARC: Examples using driving simulation and defence applications. Presentation at TNO, Soesterberg, The Netherlands, 21 January.
- Lenné, M. Measurement of human performance using simulation and on-road test vehicles – Presentation



to Delegates of the International Conference on Applied Psychology, 15 July.

- Lenné, M. Adaptation of team training principles to road safety: Simulator-based evaluation of a program to develop communication skills in young driver teams. Presentation at the International Conference on Applied Psychology.
- Lenné, M. Using innovations in vehicle instrumentation to better understand how the road system shapes road user behavior. Curtin-Monash Accident Research Centre (C-MARC) Seminar, Perth, WA, 26 August.
- Lenné, M. Human Factors and Driver Distraction. SWOV Seminar Series, Leidschendam, The Netherlands, 5 July.
- Lenné, M. Measuring driver behaviour using simulation and on-road test vehicles: Case studies using rail level crossings. School of Psychology, Uni. of Nottingham, 26 November.
- Rudin-Brown, C.M. Paved with good

intentions: Why driver assistance and child restraint systems (CRS) don't always work as intended, Curtin-Monash Accident Research Centre (C-MARC) Seminar, Perth, WA, 17 May.

- Rudin-Brown, C.M. Changes in observed driver behaviour following extended use of in-vehicle backing aids, 2010 International Conference of Applied Psychology, Melbourne, VIC, 13 July.
- Rudin-Brown, C.M. Human-Machine Interaction (HMI) research: Behavioural Adaptation to In-vehicle Technologies, SAE Australasia Symposium, Melbourne, Victoria, 10 September.
- Rudin-Brown, C.M. Usability of the Universal Attachment System (ISOFIX) for child restraint systems in school buses and passenger vehicles, SAE Australasia Child Restraint Systems Symposium, Melbourne, Victoria, 10 November.
- Salmon, P. M. Driver behaviour at rail level crossings: an exploratory on-road study. Invited presentation

at the Human Factors in Transport Conference, 9th December 2010, Crown Plaza Darling Harbour.

- Salmon, P. M. Is it really better to share? Distributed situation awareness theory, modelling and C2 applications. Invited presentation to the Defence Science and Technology Organisation Land Operations Division, Adelaide, 18 June.
- Salmon, P. M. Putting training in motion: investigating the use of motion in simulation-based military vehicle crew training. Presentation at the International Conference on Applied Psychology, 15 July, Melbourne, Australia
- Young, K.L. Driver Distraction: Safety Issues and Countermeasures. Australasian Fleet Managers Association (AfMA) National Fleet Conference & Exhibition, March.

*The team regularly uses MUARC's On-Road Test Vehicle, in which vehicle, driver and eye tracking data are recorded through sensors and computers, while cameras record the road scene and views of the driver and controls. Here, driver Julie is being monitored by researcher Miranda Cornelissen.*



The team's work includes evaluating speed cameras.



# Injury Analysis and Data

The collection, management, analysis, interpretation and presentation of data underpin a wide range of critical research areas in the safety sciences. The Injury Analysis and Data (IAD) Team comprises researchers with specialist training in the fields of numerical and behavioural sciences and has a strong focus on safety science research requiring a high degree of numerical acumen. The team focuses primarily on road safety research but also has broad experience in many other areas of safety research.



**Team Leader**  
**Dr. Stuart Newstead**  
PhD, MSc, BSc(Hons)  
Senior Research  
Fellow (D)



**Belinda Clark**  
BA, BBS(Hons)  
Research Fellow (A)



**Angelo D'Elia**  
BE(Hons), BSc(Hons)  
Research Fellow



**Kathy Diamantopoulou**  
MSc, BSc(Hons)  
Research Fellow

## Expertise

The IAD team has high-level specialist training in numerical sciences including applied statistics and applied mathematics as well as training in mechanical engineering and psychology. The team has specific topic-related expertise in safety program and policy evaluation, provision of policy and strategy advice particularly in the areas of police enforcement programs, vehicle safety rating, evaluation and monitoring through analysis of real-world data, and the collection, management, linkage and high level statistical analysis of injury data systems. The team also has expertise in providing high-level statistical analysis and research design advice both within and outside MUARC.

### Resources

The IAD team has physical and intellectual resources at its disposal to facilitate high quality quantitative safety research.

The IAD team has a range of high-level methodological expertise in safety research including:

- Experimental design and sample size estimation
- Design and conduct of surveys
- Database design, management and processing
- Database linkage
- High level statistical analysis including the full range of modern statistical techniques
- Economic analysis
- Statistical consulting and statistical software.

The team also has significant topic-based expertise in a range of safety issues with particular focus on:

- Road safety program evaluation
- Vehicle safety evaluation, monitoring and policy setting
- Police enforcement programs including policy and practice advice
- Vulnerable and high-risk road user safety and countermeasures
- Injury data analysis

### Databases

The IAD team holds or has used extensively a wide range of databases relevant to road safety and broader public health research. Researchers have also developed an in-depth knowledge on the content, management, manipulation and analysis of these data sources along with a clear understanding of the strengths and

limitations in the use of each for safety research. Databases include:

- Comprehensive police reported road crash data from each Australian state and territory and international road crash databases from New Zealand, United Kingdom, France, Germany, Finland and the United States. Police databases from Australia and New Zealand have been enhanced with detailed vehicle make and model information via an IAD team developed process of vehicle identification number decoding.
- Database of claims to the Transport Accident Commission for injury compensation from transport-related crashes. This data has been recently linked to the Victorian police reported crash data to enhance the capability to relate crash circumstances with detailed injury outcomes from the claims data.
- Snapshots of vehicle registers from a number of Australian jurisdictions and New Zealand enhanced with detailed vehicle make and model information via the IAD VIN decoding process.
- Vehicle inspection data from the New Zealand Warrant of Fitness test that can be used to estimate vehicle travel through odometer readings and related to broad registered owner characteristics such as age, gender and broad postcode of residence. This data has also been enhanced with detailed vehicle make and model information from the New Zealand vehicle register.
- The MUARC road safety countermeasure monitor data system, which collects information on key road safety activity outputs, socio economic and exposure, factors in Victoria influencing road safety outcomes. Road safety activity output data covers major enforcement programs such as alcohol breath testing, camera based automated enforcement and road safety related publicity data. Socio-economic and exposure data include labour force statistics, an alcohol consumption index, population data and travel estimates derived from fuel sales data.

NB: Use of many databases is governed by approvals from the authorities supplying the data. Permission from the data supplier is generally required for use of any data in new research projects.

## Highlights and Outcomes

### Vehicle Safety Research

The team continues to conduct a strong program of vehicle safety research, based on the analysis of extensive real world data sources including police crash reports and injury insurance compensation claims across Australia and New Zealand. Major 2010 outcomes included:

- Research examining the relative secondary safety profile of vehicles driven by different driver groups and in different jurisdictions of Australasia was completed. The research identified significant differences in the secondary safety performance of vehicles driven in different jurisdictions and by various age and gender groups. NSW and Victoria had the newest safest vehicle fleets and NZ by far the oldest and least safe. The study further highlighted the problem of young drivers, and particularly young female drivers, being in the oldest least safe vehicles but also highlighted the potential for vehicle safety improvement amongst older drivers. The study also identified important crash pattern differences for different driver demographics, which could have important implications for encouraging safer vehicle choices and the uptake of particular new safety technologies. Results of this study were also published in Accident Analysis and Prevention.
- The August launch of the annual Used Car Safety Ratings, a major output from the research program that provides consumer advice on relative vehicle safety in the event of a crash. The Used Car Safety Ratings rate vehicles by make and model on three major dimensions of injury protection, (1) their ability to protect their own occupant in a crash (crashworthiness), (2) the second is their ability to protect other road users with which they collide (aggressivity), and (3) the total secondary safety index. The latter gives the combined crashworthiness and aggressivity performance of a vehicle with appropriate weighting given to each component based on its relative importance in leading to overall trauma outcomes in a crash. Australian and New Zealand road authorities and motoring clubs make the ratings for consumers. In Victoria, they contribute significantly to the

vehicle safety information available at the Transport Accident Commission's [howsafeisyourcar.com.au](http://howsafeisyourcar.com.au). Peer review of the ratings methodology remains a priority with the methodology for calculating the Total Secondary Safety Rating recently published in Accident Analysis and Prevention.

- Using the New Zealand Warrant of Fitness data and vehicle register snapshots from various Australian states, estimates of the differential crash risk associated with various vehicle market groups for both motorcycles and light passenger vehicles were derived. The research also covered an

investigation of the potential for optimising the light vehicle fleet with respect to crash risk characteristics of motorcycles and cars by changing the profile of vehicle market groups present in the light vehicle fleet.

- Results of a study of the relationship between vehicle colour and crash risk were published in the peer review journal Safety Science.

A range of new vehicle safety related research projects also commenced during 2010 including:

- Building on the completed research project examining vehicle choice by various age and gender groups, a project has commenced specifically examining vehicle choice amongst older drivers. The project is examining safety performance related to older driver vehicle choice and its implications for trends in older driver road trauma with a particular goal of identifying the particular older driver sub-groups driving the most unsafe vehicles in order to focus countermeasures. It will also examine the potential trauma reduction benefits of various strategies to improve older driver vehicle choice.
- Many jurisdictions in Australasia now have a graduated licensing scheme for novice drivers, often including some form of restriction on the types of vehicles probationary drivers are allowed to drive. In general, selection of the types of vehicles from which probationary drivers are banned from driving under the GLS regulations have not been identified by any objective research based information. This project is analysing the crashworthiness and crash risk profiles associated with young drivers in both vehicles currently restricted for young drivers under the GLS regulations in various jurisdictions as well as for vehicles not currently restricted. It aims to investigate whether current restrictions are effective in reducing young driver road trauma as well as identifying alternative vehicle

restrictions that might produce greater benefits.

**Road safety program evaluation**

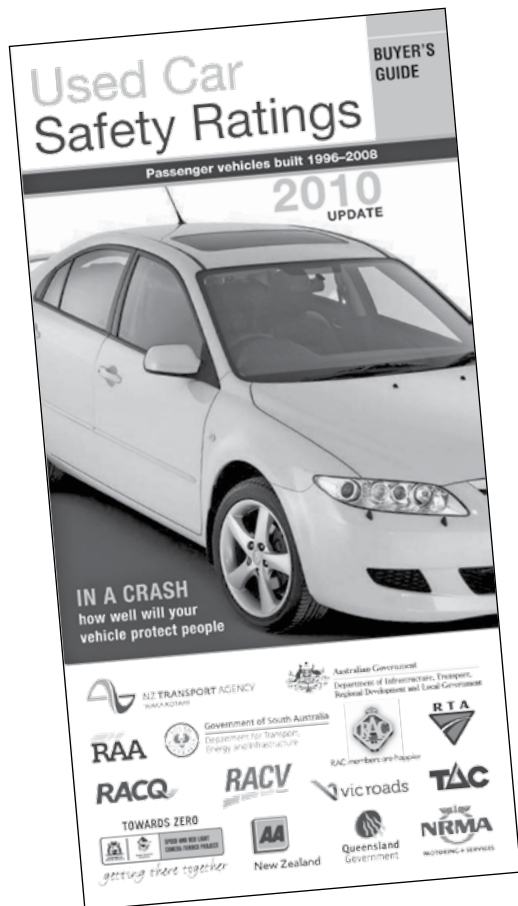
Thorough scientific evaluation of road safety programs is vital to ensure programs are achieving their desired outcomes and providing the best possible outcomes given the investment. The outcomes from rigorous program evaluations are also useful for fine-tuning the performance of existing programs as well as prioritising future program expenditure. The IAD team research program in 2010 included a number of evaluations and development of evaluation methods including:

*Development of a framework for evaluation of the Queensland road safety strategy*

Road safety strategies have been developed and implemented in jurisdictions across Australasia to focus efforts and resources with the goal of achieving set targets for road trauma reduction. Evaluations of specific programs implemented as part of road safety strategies are common. Rarely however is the success of the road safety strategy as a whole evaluated in a comprehensive and systematic manner. This project developed a comprehensive evaluation framework for road safety strategy outcome evaluation for Queensland based on the GOSPA framework of defining a road safety strategy formulation. It is designed to assess the progress of the strategy against the pre-determined goals and objectives at various levels of detail through a multi-tiered modelling approach. Successful application of the framework was demonstrated on the 1993-2003 Queensland Road Safety Strategy. A peer-reviewed paper on the project was presented at the 2010 Australasian Road Safety Conference.

*Vehicle Impoundment Evaluation*

**Program Victoria Police:** The Vehicle Impoundment or 'hoon' legislation was implemented in Victoria on 1 July 2006.



*The Used Car Safety Ratings brochure provides consumers with information on the safety of vehicles in the event of a crash.*



**Helen Donaldson** SRN, SRM,  
B.Sc., Dipl. Bus. Management  
Research Nurse



**Wesley Eadon**  
Crash Investigator



**Debra Judd**  
Dip.Ed, BApp Sci  
Data Entry



**Ron Laemmle**  
Crash Investigator

Since then there have been more than 11,000 vehicle impoundments. Victoria Police commissioned MUARC to conduct an evaluation of the Vehicle Impoundment Legislation from a road safety perspective. The project involved analysing the Victoria Police Vehicle Impoundment data as well as conducting focus group discussions with 'hoon' drivers. Hoon drivers were described according to their age and gender profile, license status, number of hooning offences and area of residence whilst trends in detected offences over time were quantified. The focus group sessions were able to identify the reported reasons for hooning as well as identify where the current legislation and enforcement practice were effective and failing in deterring the behaviour.

**Evaluation of Victoria's combined digital speed and red light cameras:**

A number of studies internationally have shown fixed speed cameras to be generally effective in reducing the incidence of speeding and crashes within the area local to the fixed camera site. The effectiveness of Red Light Cameras (RLC) to reduce crashes has also been studied on many occasions with mixed results. Combined speed and red light cameras, as have been used in Victoria for a number of years, are a relatively new technology. This study evaluated the crash effects of Victoria fixed digital speed and red light (FDSRL) cameras that have been in operation at a number of intersection for nearly seven years. Generally FDSRL cameras in Victoria only detect infringements on a single leg of the intersection although at a small number of intersections cameras are placed on two legs. In Victoria warning signs are used on each leg of an intersection where a camera is placed warning of the presence of a camera in the area. The evaluation examined effects associated with camera presence on crashes involving vehicles travelling on the intersection leg where the camera was placed. It also examined crash effects

across the intersection as a whole as a measure of intersection-wide general deterrence associated with the presence of both the camera and associated signage.

**Development of an evaluation framework for the Queensland Camera Detected Offence Program:** The Queensland Camera Detected Offence Program (CDOP) includes all modes of automated camera based traffic enforcement including red light cameras, fixed spot speed cameras, point to point cameras, combined speed red light intersection cameras and mobile speed cameras. Work has commenced on a project to develop a comprehensive evaluation framework to measure the combined effects of the CDOP on road trauma outcomes across Queensland.

**Evaluation of the Queensland Graduated Licensing System:** In July 2007, Queensland introduced a Graduated Licensing System for novice drivers aimed at curbing the road toll amongst this over represented group. This project is undertaking an evaluation of the new Queensland GLS in terms of its effects on novice driver road trauma and traffic infringements. It is examining both the effectiveness of the program overall as well as the effectiveness of certain key elements of the GLS. As part of the evaluation, a survey of the learner driver log-book experience has also been undertaken to identify both positive and negative outcomes of this element of the GLS framework.

**Road safety data systems and trend analysis**

High quality data systems underpin high quality research and ensure the best possible research outcomes across all domains of injury prevention research. During 2010 the IAD team was involved in a wide range of projects aimed at

enhancing the scope and quality of data available in the road safety research field including the following major projects:  
**De-identified Linkage of Victorian Injury Data Records: A Feasibility Study:** MUARC previously completed a Baseline project exploring the feasibility and benefits of establishing a linked road injury database including Police reported crash data, TAC claims data, hospital admissions data and in-depth crash inspection data. The extent to which TIS coding and definitional changes have impacted on Police collected injury data only serves to emphasise the importance of linking such data to other Victorian injury datasets with higher consistency and resolution injury outcome data. Results of the project showed linkage of Police reported crash data with the TAC claims dataset is feasible and results in a combined database more capable of measuring detailed injury outcome consistently over time. This is particularly significant considering that the de-identified linkage of hospital admissions data was not found to be feasible without identifying information.

**Establishing a Victorian Road Safety Research Database with Serious Injury Measures:** This project involved MUARC collaboration with the TAC to establish a linked TAC claims and Police crash dataset for use in road safety research and for monitoring trends in serious injury in Victoria. The project included specifying the content of the database and establishing an ongoing linkage process by the TAC. As part of the project, the injury coding practices of the TAC were examined and issues such as the use of multiple coding systems and their potential conversion into a single system were resolved. This included the ability to map ICD-9-CM, ICD-10-AM, ICPC-2 PLUS and SNOMED CT injury codes into a consistent injury outcome system from which measures of serious injury may be derived. The project performed a review of available measures of injury severity in order to establish measures that can



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be calculated consistently over time and identified the most appropriate measures of serious injury that can be derived from the TAC held or derived injury information in the linked dataset.

### **Review of the Countermeasure Monitor:**

A review was conducted of MUARC countermeasure monitor database with a view to expanding it to include a range in intermediate outcome measures. A range of potential data items to measure intermediate road safety performance were identified and MUARC is now working with the Victorian road safety agencies to establish feasibility and practicalities of the ongoing collection of these measures.

### **Roadside Alcohol Survey Program in Melbourne:**

This project, which was the first of its kind in Australia, involved data collection from RBT sites across Victoria Police Region One. The research team, with extensive support from the Victoria Police, attended scheduled booze bus and car based RBT sites to collect data necessary to explore the current drink driving patterns and high and low alcohol hours. The research findings support the proposal that drink driving patterns vary across zones and municipalities in Melbourne and that targeting high alcohol zones and entertainment precincts may result in higher drink driving detection rates. Car based testing on minor roads should be increased as the analysis found a greater proportion of drivers with illegal BACs on these types of roads, which may reflect attempts to avoid detection via the highly visible booze bus sites on arterial roads.

### **Development of a Road Safety Data System framework for Western Australia:**

This project has focused on developing a framework for a road safety database system to inform the full range of data focused road safety questions. The ultimate aim of the project is to define a data framework that is fully responsive to answering current queries and potentially unasked queries and information on road crashes and injuries. A major objective to be achieved as part of developing the framework is to improve the quality, completeness, relevance and timeliness of road crash and injury data collection, including the consistency of information from various sources and elimination of bias due to organisational responsibilities. The specific aim of the current project work is to develop a specification for a comprehensive road safety database system in Western Australia that will form a blueprint for the

development and implementation of the physical system. It includes the following activities: determination of road safety data system requirements, development of a conceptual framework for an ideal system, review of existing road safety data systems in WA, identification of key requirements for moving to an ideal system and development of specifications for a multi-user access system.

### **Strategic analysis and advice**

Lessons learned in conducting evaluation research and data analyses often put researchers in a strong position to provide strategic advice and targeted strategic analysis to agencies developing road safety policy and programs. Through its extensive experience accumulated, the IAD team has been involved in a range of projects during 2010 offering strategic advice to government authorities including:

**Vehicle Safety Policy Papers:** producing a series of road safety policy papers which summarise knowledge in specific areas of vehicle safety stemming from both MUARC research and other national and international research, and interpreting this knowledge in the context of possible policy options. Specific areas of vehicle safety on which these papers will focus are young driver vehicle choice, the potential benefits of current and future vehicle safety technologies and quantifying and improving the relationship between crash barrier test and real world data derived vehicle safety ratings.

**Strategies for managing recidivist speeding – C-MARC Fact Sheet:** MUARC continues to support C-MARC in the production of fact sheets that provide strategic advice for policy development. One fact sheet produced during 2010 focussed on the issue of recidivist speeding with the aim of:

- outlining the current management strategies for speeding
- identifying how the current management strategies address recidivist speeding
- outlining research into the effectiveness of the current management strategies, and
- commenting on WA's Towards Zero road safety strategy and its focus on speed management.

### **Identifying traffic enforcement practices and opportunities in Western Australia:**

This was a three-phase project, carried out through C-MARC, that aimed to identify traffic enforcement practices in Western Australia and the opportunities

for improvement reflecting best practice elsewhere and scientific evidence of effectiveness. Phase 1 during 2010 was a review of effective Australian and international practice in traffic enforcement. It also reviewed the extended role that traffic police could play in the Safe System approach to road safety. Phase 2 commenced during 2010 and will include workshops with Western Australia traffic police to identify issues and opportunities based on practice elsewhere, as well as the unique characteristics of traffic policing in the State. Phase 3 will aim to bring together the external and local experience to develop strategies for potential improvement in traffic enforcement practice and any further research necessary in Western Australia.

## Presentations

- Newstead, S. Evaluation of Legislation and Regulation, Lecture, Monash Institute of Regulatory Studies, May
- Newstead, S. A proposed framework for the evaluation of road safety strategy outcomes 2010 Road Safety Research Policing and Education Conference, Canberra, September 1-3
- Newstead, S. Current vehicle safety issues in Australasia 2010 Road Safety Research Policing and Education Conference Vehicle Safety Workshop, September 3
- Newstead, S. Current vehicle safety issues in Australasia Newstead, S. Current vehicle safety issues in Australasia Motor Accidents Commission Board Meeting Presentation, CrashLab, November 19
- Newstead, S. MUARC's Vehicle Safety Research Program, Strategic Vehicle Safety and Environment Group Meeting, Canberra, December 8
- Newstead, S. The Used Car Safety Ratings Research Program Presentation to the TAC Sub-Board, March 25
- D'Elia, A. Data Systems for the Effective Implementation of a Safe System Approach 2010 Road Safety Research Policing and Education Conference, Canberra, September 1-3
- D'Elia, A. Establishment of a Robust Measure of Serious Injury Presentation to the TAC Sub-Board, December 8
- Scully, J. Evaluation of electronic stability control and side curtain airbags Presentation to the TAC Sub-Board, December 8

*The team researches exposure to risk of recreational boaters, measured in trips and hours spent on the water.*



# Injury Surveillance and Epidemiology

Injury surveillance and epidemiology are concerned with the distribution and determinants of injury in the population, and the application of that knowledge to the prevention of injury. A substantial component of our work is focussed on the ongoing and systematic collation, analysis, interpretation and dissemination of health data on injury-related incidents to support preventive action and research. Considerable effort is put into quality assurance and the ongoing development of the health datasets that are held by the team to improve their usefulness. The other main themes of our research program are marine (recreational boating) safety, child safety, consumer product safety, occupational safety and falls among older people.



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*Falls are a significant threat to the safety, health and independence of seniors. The team is working on a project to support the Victorian government response to falls prevention.*

### Expertise

This diverse research team have qualifications and specialist training in public health, epidemiology, health promotion, statistics, psychology, humanities, social sciences, ergonomics and engineering. Collectively the team has experience in identifying injury issues, understanding injury mechanisms and risk factors, and testing and evaluating interventions. Study designs and methods commonly used by the team include injury surveillance and descriptive research, case-series studies, observational field studies, case-control studies, cohort studies and randomised controlled trials. The team is also experienced in database development, maintenance and analysis and is active in facilitating the translation of research to policy (including the development of safety regulations and standards) and practice.

### Resources

The Victorian Injury Surveillance Unit, funded by the Victorian Department of Health, operates within the ISE team. VISU holds three injury surveillance datasets containing many thousands of cases: the Australian Bureau of Statistics Causes of Death Unit Record File (ABS-DURF: injury deaths), the Victorian Admitted Episodes Dataset (VAED: injury hospital admissions) and the Victorian Emergency Minimum Dataset (VEMD: injury emergency department presentations). VISU's data and information service is available, mostly free of charge, to government and non-government departments, agencies and organisations, health promotion and injury prevention organisations, community groups, business, media and researchers.

VISU research staff provide data reports to support the development and evaluation of health and safety policies, safety regulations and standards, and injury prevention interventions and research.

### Highlights and Outcomes

#### Falls in the ageing population

This year saw the start of a four-year Partnership Project (funded by the NHMRC and Victorian Department of Health), 'Reducing falls among older people in Victoria: better evidence, better targeting, better outcomes'. The aim of the project is to enable a more effective policy response to the falls prevention challenge in Victoria. It is designed to underpin a re-orientation of the Department of Human Services' falls prevention program and evaluate its delivery. Falls remain a significant threat to the safety, health and independence of our older citizens. Falls prevention is an important component of promoting healthy and independent ageing, and containing medical and support service costs. There is now substantial evidence about effective falls prevention interventions, particularly among community dwelling older people. However, the potential for the research evidence base to translate into falls reductions has not yet been fully realised. The challenge now is to deliver the most effective interventions efficiently at a population level, and for these interventions to be taken up by older people.

The research plan comprises a series of discrete components that will be integrated into a two-year falls prevention program plan for Victoria. The objectives are to:

1. Facilitate improved targeting of evidence-based falls interventions to groups of older people most frequently hospitalised for fall-related conditions



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**Matoula Leichman**  
Group Administration  
Officer



**Khic-Houy Prang**  
BAppSc (Hons), BA  
Research Assistant

2. Identify factors that encourage and support older people to make relevant fall preventing lifestyle changes
3. Examine the acceptability of the currently proven falls interventions to older people
4. Identify opportunities in existing government programs and services to incorporate evidence-based falls interventions into policies and practices, especially where there is a good match between current priorities and the proven falls interventions
5. Develop and test guidelines for sustainability based on the known factors that encourage and support relevant agencies and programs to incorporate and sustain falls interventions

Substantial progress was made in 2010 and results from each of these components will be available in 2011. The protocol has been published online by Injury Prevention. Chief investigators are Dr Lesley Day and Prof Caroline Finch from MUARC, Prof Keith Hill National Ageing Research Institute and La Trobe University, A/Prof Terry Haines Monash University and Southern Health, A/Prof Lindy Clemson University of Sydney, and Ms Catherine Thompson and Ms Margaret Thomas Victorian Department of Health.

### Workplace Safety

The Employer Performance Management Program (EPMP) is a WorkSafe Victoria program adopting a collaborative approach focusing on high-level organisational drivers to achieve sustainable improvement in Occupational Health and Safety in large organisations. Participation in the program involves undergoing an intensive audit and data collection activity, which forms the basis for a comprehensive performance report identifying strengths and opportunities for improvement. Organisations respond to this report by producing and implementing an action plan that focuses on three to five themes from the performance report. The evaluation of the EPMP is a quasi-

experimental non-randomised four-year study of participating organisations (the intervention group), and non-participating organisations (the comparison group). The approach is a combination of quantitative and qualitative methods including self-report surveys, key informant interviews, focus groups, document analysis and claims data analysis. The EPMP is being delivered to three groups or branches of organisations defined by the period in which the organisations first engaged with the EPMP. Evaluation activities for organisations are staged according to their progress through the EPMP.

Early results indicate that the performance reports are meaningful and informative for the participating organisations, particularly the benchmarking claims performance data, and associated interpretive summaries. A considerable proportion of issues identified in the performance reports (43%) have been taken up in action plans. In addition, organisations have identified additional areas for action and are including at least some of these in their action plans. The evaluation has not yet reached the stage at which firm conclusions can be drawn about changes in performance following the EPMP. Organisations are reporting that action plan implementation is occurring. WorkSafe and the participating organisations have observed a number of unanticipated positive effects and few negative effects. The EPMP was rated as a valuable program by the organisations.

The Institute for Safety, Compensation and Recovery Research funds this project. Chief investigators are Dr Lesley Day, Dr Michael Lenne, Dr Stuart Newstead, and Prof Rod McClure. The project team includes research staff from the Human Factors and Behavioural Safety Science Teams.

### Injury surveillance research

Through the VISU Data and Information Service, VISU produced and disseminated 213 short injury reports on specific injury causes (for example, falls, transport, assaults, self-harm), settings (for example,

home, school, workplace) and activities (such as type of work, sport etc.) and on injury related to consumer products. Clients included federal and state government departments and agencies (including health, education, transport and consumer affairs), local councils, parliamentary committees, coroners' investigations, non-government bodies including safety organisations, industry, graduate students, researchers, the media and community members. Data reports were used for injury prevention and research purposes, evaluations and for population health monitoring.

We also published four issues of the VISU e-publications *Hazard* and the E-Bulletin in 2010. Both *Hazards* reported studies of traffic-related pedestrian injury. In Edition 71, data on pedestrian hospital-treated injury, extracted from the Victorian hospital injury surveillance datasets held by VISU, were analysed and interpreted and the literature on preventive measures reviewed. In Edition 72, pedestrian fatalities data extracted from the National Coroners Information System were examined in detail for trends, patterns and contributory factors to pedestrian deaths.

In Editions 5 and 6 of the VISU E-Bulletin, the latest available year of injury death data (2006) provided by the Australian Bureau of Statistics, and the latest available year of hospital-treated unintentional injury data (2009), extracted from the VISU-held hospital injury surveillance datasets, were analysed and interpreted by age group to identify priority issues for prevention.

More than 1500 hard copies of each issue of *Hazard* are distributed through our general and special mailing lists. Current and past issues of *Hazard* and the E-Bulletin can be downloaded from [www.monash.edu.au/muarc/visu](http://www.monash.edu.au/muarc/visu).

VISU also monitors and reports progress on the Victorian injury health outcome indicators for the Department of Health and child health outcome indicators for the Department of Education and Early Childhood Development. ►



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BSc(Hons)  
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### Recreational boating safety

In 2010, the ISE group completed its second three-year program of research for Marine Safety Victoria (MSV), the state authority responsible for maritime safety. The research was mainly in the area of recreational boating safety.

The final project was an exposure-to-risk survey of recreational boaters. We conducted four quarterly postal surveys of a random sample of 1600 registered recreational powered boat owners between 1 October 2008 and 30 September 2009. The survey collected boater exposure data (measured in trips and hours spent on the water) by activity (fishing, towed water sports etc.), boating incidents and injury data and boater demographic data. The survey data were analysed and a report on exposure to recreational boating activities was submitted to MSV in June 2010.

The survey showed that registered powered recreation vessels took an estimated 913,000 trips (2.2 million person trips) and spent 5.7 million hours (14.3 million person-hours) on the water in the 12-month survey period. Exposure was different for the different vessel types and boating activities. The data will be used to estimate incident rates for recreational boating-related deaths and hospital-treated injury when the numerator data are available from the National Coroners Information System and the Victorian hospital injury datasets in 2011.

### Dog bite in children

The Bureau of Animal Welfare (BAW) funded the ISE group to conduct a qualitative study titled 'Call back study of child (aged 0-9) dog bite injury cases in the domestic setting'. Over the 12 months to October 2009 we recruited 51 child dog bite cases from seven hospital-emergency departments and conducted in-depth telephone interviews with the parents/carers of the bitten children and the dog owner wherever possible. The aim of this qualitative study was to better understand the circumstances, potential contributory factors and outcomes of child dog bite injury that occurred in the victim's own home or the home of a relative, friend, acquaintance or neighbour.

Child-related potential risk factors were found to include: young age, overconfidence with dogs, familiarity with biting dog, lack of close parental/carer supervision, encroachment on dog's territory and intentional or unintentional provocation of the dog. Dog-related potential risk factors included male sex, small size, having slept in someone's bed in their first two months in the household, lack of exercise, lack of formal or informal obedience training, inability to obey basic commands (lack of training) and existing health conditions. Breed of dog did not appear to contribute to risk.

Telephone recruitment of a control group of children from the general community in the same local government

area as the cases, who interacted with a dog in a domestic setting and were not bitten in the previous month, is complete. Data on cases and controls are being analysed by Linda Watson, a MUARC PhD student, who is undertaking this project as part of her study of the effectiveness of regulations in reducing dog bite injury.

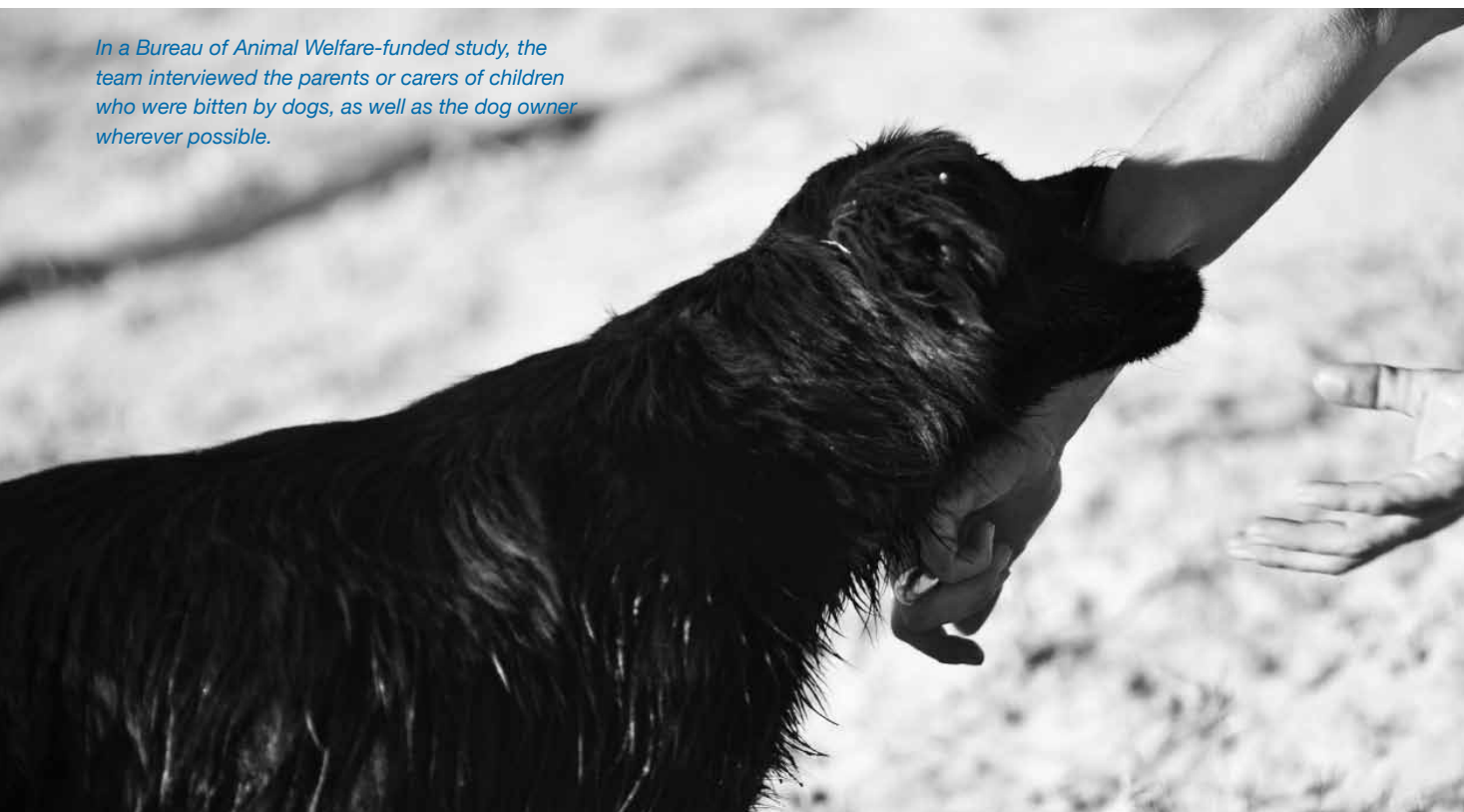
### Targeted study of injury data involving motorised mobility scooters

This collaborative project, funded by the Australian Competition and Consumer Commission (ACCC), was undertaken in partnership with the Department of Forensic Medicine. The study found there were 442 motorised mobility scooter (MMS) fall injury hospitalisations in Australia between July 2006 and June 2008, however the total number of MMS hospitalisations for the same period is likely to be greater than 700 due to coding issues and missing data.

Males and females were evenly represented in injury cases. Lower extremity injury was the most common type of injury across all age groups and fractures accounted for most injuries. The most common place of injury occurrence was the road, street or highway followed by the home.

There were at least 62 identified fatalities related to MMS use from July 2000 to August 2010 in Australia; some possible cases were still under investigation. Men were significantly

*In a Bureau of Animal Welfare-funded study, the team interviewed the parents or carers of children who were bitten by dogs, as well as the dog owner wherever possible.*





Four editions of Hazard were published in 2010.

over represented in deaths. Most deaths were caused by head injury to the user related to crashes between a MMS and a motor vehicle. A large proportion of fatalities occurred when MMS users were crossing a road, attempting to alight from the scooter and entering or approaching intersections.

Consultation by telephone with a range of key informants and a sample of MMS users was also undertaken. Support for the ongoing use of motorised mobility scooters by older people and people with disabilities was strong. The need for formal assessment and training programs was also strongly supported but the cost, need for regular re-assessment and possible reduction in access to MMS as a result of compulsory assessment and training were issues of concern. Safety issues raised were: the wide variability in design of mobility scooter that led to poor scooter selection by some older people; lack of compliance with manufacturing and design standards; and the absence or poor maintenance of footpaths in many areas.

The findings represent an initial step in understanding the safety issues related to MMS and highlight that any solutions need to be focused on preventing injury and death while minimising any negative effects on mobility for older persons.

### Staff Membership on Boards and Committees

- AIPN National Conference on Injury Prevention and Control Scientific Program Committee 2010 (E. Cassell)
- Victorian Safe Communities Network

- (VSCN), Executive (E. Cassell)
- Kidsafe Victoria, Board (E. Cassell)
- City of Melbourne Injury Prevention Committee (E Cassell)
- Victorian Child and Adolescent Monitoring System (VCAMS) Data Management Committee convened by the Department of Education and Early Childhood Development (DEECD) (E. Cassell)
- Australian Catholic Religious Against Trafficking in Humans (ACRATH) Evaluation Committee (E. Cassell, pro bono)
- Farmsafe Australia (L. Day)
- Farmsafe Victoria (L. Day)
- Injury Prevention, Editorial Board (L. Day)
- Journal of Agricultural Safety and Health, Associate Editor (L. Day)

### Presentations

- Cassell E, Clapperton A. Fall injury and fall-related hip fracture hospitalisations among older people in Victoria, Australia, 4th Australian and New Zealand Falls Prevention Society Conference 21-23 November, University of Otago, Dunedin, New Zealand, [abstract, poster presentation].
- Ashby K, Cassell E. Call back study investigating child dog bite injury that occurs in the domestic setting in Victoria, Australia. Safety 2010 World Conference 21-24 September, London, United Kingdom, [abstract, presentation]
- Clapperton A, Cassell E. Downward trend in fall-related hip fracture rates in persons aged 65 years and older, Victoria, Safety 2010 World Conference 21-24 September, London, United Kingdom, [abstract, poster presentation].
- Clapperton A, Cassell E. The impact of area based socioeconomic inequity on serious injury in Victoria, Australia. Poster presentation to Safety 2010 World Conference 21-24 September, London, United Kingdom, [abstract, poster presentation].
- Cassell E, Ashby K, Prang K, Clapperton A. Exposure to risk in recreational power boating in Victoria, Australia. Poster presentation to Safety 2010 World Conference, 21-24 September, London, United Kingdom, [abstract, poster presentation].
- Day L. Evaluation of WorkSafe Victoria's Employer Performance Management Program, 20th Anniversary Seminars, Injury Prevention Research Unit,

- University of Otago, 19 Nov (keynote presentation)
- Day L. Reducing falls among older people in Victoria: better evidence, better targeting, better outcomes. 4th Aust NZ Falls Prevention Society Conference, Dunedin, 21-23 Nov
- Day L. Identifying priority groups for improved targeting of falls interventions. 4th Aust NZ Falls Prevention Society Conference, Dunedin, 21-23rd Nov (poster presentation)

Presentations given by non-MUARC staff who are collaborators on research projects led by MUARC staff

- Vrantsidis F. Development and evaluation of falls prevention program sustainability guidelines and training program. 4th Aust NZ Falls Prevention Society Conference, Dunedin, 21-23 Nov (poster presentation)
- Haines T. Comparison of likely uptake between five evidence-based falls prevention strategies. 4th Aust NZ Falls Prevention Society Conference, Dunedin, 21-23 Nov (poster presentation)

*A targeted study of injury data involving motorised mobility scooters found that the most common place of injury occurrence was the road, street or highway.*



Deaths and serious injuries at intersections make up about one-third of all severe road trauma across Australia. Roundabouts are one of only a few currently available forms of intersection design that meet Safe System principles.



# Safe System Strategy and Infrastructure

The Safe System Strategies and Infrastructure Team strives to conduct high quality injury prevention research for translation into practical policies, programs and actions capable of delivering major reductions in severe trauma.



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**Dr. Jeffery Archer** PhD  
(Traffic Eng), BSc(Hons)  
Senior Research Fellow (C)

The main areas of focus for the team's work in 2010 were:

- Developing scientifically based management systems for practical, efficient and strategic application of high-impact initiatives
- Facilitating the timely take-up by implementing agencies of research into practice
- Developing or adapting best practice initiatives that deliver lasting, fundamental reductions in serious injury risk
- Infrastructure evaluation, design and development
- Creating low-risk traffic environments for the most vulnerable road users, namely, pedestrians, motorcyclists and bicyclists
- Identifying development and training needs for two motorcycle rider groups at elevated risk, namely, newly licensed and returning motorcyclists.

The SSSI Team comprises professional and administrative support staff spanning a variety of relevant backgrounds and areas of expertise including:

- Road infrastructure design and operation
- Psychology
- Civil and Mechanical engineering
- Biomechanics and vehicle safety
- Industrial traffic management and safety
- Statistical analysis
- Physics, and
- Strategy development and target setting.

## Expertise

The team has specialist expertise in the areas of pedestrian and motorcyclist safety, and collaborates on in-depth crash investigations. Striving to meet the principles underpinning the Safe System vision ensures a high degree of innovation in the team's research outputs. The team has experience in a variety of areas including identifying and understanding road safety injury mechanisms and risk factors, designing and evaluating countermeasure programs and translating new research knowledge into policy and practice. The team typically utilises a variety of study methods such as simulation, mathematical modelling, database development, maintenance and

analysis and before-after evaluations of on-road treatments.

## Resources

A key strength of the team is its endeavours to develop practical ways to meet the aspirations of Australasia's Safe System road safety vision. Opportunities continue to be developed in the areas of road safety strategy development and target setting, infrastructure design and the more effective management of travel speeds. Translating new research findings into practice also continues to receive special attention.

## Highlights and Outcomes

The team's focus on road safety strategy development and target setting continued in 2010, with work taking place at both a national level and for individual states and territories. A new application of our modelling commenced in New Zealand with a view to strengthening the effectiveness of infrastructure investments in road safety.

Good progress continued during 2010 on intersection safety and design, one of the team's major areas of research activity. The project reviewed current intersection designs to assess their compatibility with Safe System principles. New designs were also created that better aligned with the study's aims of minimising the risk of fatal and serious injury at intersections. To accelerate the take up of promising new designs, the team has selected several intersection designs for assessment using simulation techniques, while other designs already in use overseas will be trialled on-site. It is hoped that these designs will have widespread application throughout Australia and make a substantial contribution to the achievement of Safe System performance at intersections. Bruce Corben presented on the topic at international workshops at the Edmonton Urban Traffic Safety Conference to share knowledge with, and gain feedback from, international delegates.

The intersection design project benefitted from further international collaboration through a MUARC-SWOV exchange. Nimmi Candappa spent nine months at SWOV, the Dutch Research

Organisation. The exchange aimed at maintaining ongoing collaboration and sought mutual gain in road safety knowledge and practice through project involvement, and expanded networking opportunities. Nimmi was actively involved in a number of SWOV-specific projects that had an infrastructural slant, and involved European Union collaborators. While there, she also furthered collaboration on the intersection project, represented SWOV at an international workshop, and liaised with MUARC-Prato as well as key road safety organisations including the Swedish Road Administration and Transport Research Laboratory.

Together with Honda Australia Rider Training and Learning Systems Analysis, the team completed its development of an on-road coaching program for newly licensed motorcyclists this year. The world-first Motorcycle Safety Levy funded program was developed for Victorian riders to assist in improving safety. The four-hour program involves small groups of riders receiving feedback and advice on their riding by an experienced rider coach. A pilot study was completed in March and a large-scale trial of 2400 riders began in June following a public media launch of the program by Transport Minister Tim Pallis and Chair of the Victorian Motorcycle Advisory Council, Mr Neil O'Keefe. The George Institute for Global Health will evaluate the impact of the program on safety outcomes following completion of the trial in late 2011.

The team also finalised its recommendations for development of a training program to improve safety for returning motorcyclists. Christine Mulvihill presented the outcomes of some of this research at the 8th International Motorcycle Safety Conference in Cologne, Germany.

Other team highlights in 2010 included:

- assistance to the OECD with preparation of a major report on improving provisions for walking. The OECD-funded project has brought together the views of international experts, especially from highly motorised European countries. The report is expected to be published in late 2011 and make an important contribution to safe, healthy and sustainable forms of transport. ►

- continuation of phase two of the Enhanced Crash Investigation (ECI) project. This five-year VicRoads-funded project is an in-depth motorcycle and passenger car crash investigation program focussing on the collection and assessment of potential contributory factors in crashes. Collaborators on the project include Victoria Police, Ambulance Victoria, Country Fire Authority, State Emergency Service, Department of Health, local government authorities and VicRoads regional staff.

### Staff Membership of Boards and Committees

- Older Pedestrian Stakeholder Reference Committee, convened by VicRoads (B. Corben)
- Victoria's Speed Limits Advisory Group, convened by VicRoads (B. Corben)
- VMAC Victorian Motorcycle Advisory Council, Minister for Transport, Member (B. Corben)
- Victorian Road Safety Reference Group (B. Corben)

- Tasmanian Road Safety Advisory Council (B. Corben)
- The Canadian Association of Road Safety Professionals (N. Candappa).

### Presentations

- Corben, B. (2010) 'A New Road Safety Strategy for Victoria: The METS Model Macro-Estimates for Target-Setting', Presentation to Transport Accident Commission, Monash University



*The team has expertise in the area of motorcycle safety and uses study methods including the simulator.*



**Nimmi Candappa**  
BEng(Civil)(Hons), BA(Jap)  
Research Fellow



**Wesley Eadon**  
Crash Investigator



**David Taranto**  
BE (Elec)/(Hons), BSc  
Research Assistant



**Matoula Leichman**  
Group Administration  
Officer



**Sara Liu**  
BBSc; GradDip(Psych);  
PostgradDip(Psych)

- Accident Research Centre, Melbourne, 8 December
- Corben, B. (2010) 'Country Driving in Victoria: The Main Hazards', Presentation to Monash University Medical Students, Monash University, Melbourne, August
  - Corben, B. (2010) 'Development of a Strategic Road Safety Plan for Prato Provence', Prato Open Day, Prato, April
  - Corben, B. (2010) 'Presentation to Delegation from the Department of Education and Training Abu Dhabi Police', Monash University Accident Research Centre, Melbourne, 17 May
  - Corben, B. (2010) 'Presentation to Hong Kong Delegation', Monash University Accident Research Centre, Melbourne, 25 February
  - Corben, B. (2010) 'Progress with Meeting Victoria's Intersection Safety Challenge', Edmonton's International Conference on Urban Traffic Safety Improving Urban Traffic Safety Championing Collaboration for Success in our Communities, Edmonton, Alberta, Canada, 29 April
  - Corben, B. (2010) 'Progress with Meeting Victoria's Intersection Safety Challenge', Presentation to Transport Accident Commission – Marketing and Road Safety Committee, Monash University Accident Research Centre, Melbourne, 8 December
  - Corben, B. (2010) 'Raising Safety Levels on Major Urban Arterials', Transurban Excellence in Infrastructure Conference, Melbourne, 18 March
  - Corben, B. (2010) 'Star-Rating System for the Safety of Pedestrian Walking Routes: A Pilot Study', The 11th International Walk21 Conference, The Hague, The Netherlands, March
  - Devlin, A. (2010) 'Towards Zero Pedestrian Trauma: Literature Review and Serious Casualty Analysis', Presentation to Australasian Road Safety Research, Policing and Education Conference, Canberra, 2 September
  - Hillard, P. (2010) 'The Enhanced Crash Investigation Programme', Presentation to Royal Society for the Prevention of Accidents 75th Annual Congress, Stratford-upon-Avon, UK, 22-24 March
  - Logan, D. (2010) 'Baseline Strategy Modelling Component 2: Enhancing METS', Presentation to Baseline Project Advisory Committee, Melbourne, September
  - Logan, D. (2010) 'Modelling for the Tasmanian Road Safety Action Plan, 2010-2013', Presentation to Chair of Tasmanian Road Safety Council and DIER Tasmania, Hobart 29 November
  - Logan, D. (2010) 'National Road Safety Strategy 2011-2020: Strategy Options', Presentation to Australian Standing Committee on Transport and the National Road Safety Council, Melbourne, 1 June
  - Logan, D. (2010) 'National Road Safety Strategy 2010-2020 Model Development and Preliminary Results', Presentation to National Road Safety Strategy Taskforce, Department of Infrastructure, Melbourne, 15-16 February
  - Logan, D. (2010) 'Queensland Road Safety Strategy 2012-2021: High Priority Problem Summary', Presentation to Queensland Department of Transport and Main Roads, Brisbane, 13-15 December
  - Logan, D. (2010) 'Queensland Road Safety Strategy 2012-2021: Modelled initiatives and preliminary results', Presentation to Queensland Department of Transport and Main Roads, Brisbane, 13-15 December
  - Logan, D. (2010) 'Queensland Road Safety Strategy Initiative options', Presentation to Queensland Department of Transport and Main Roads and MUARC Expert Panel, Melbourne, 15 October
  - Logan, D. (2010) 'Queensland Road Safety Strategy 2012-2021: Strategy Development Workshop', Presentation to Queensland Department of Transport and Main Roads, Brisbane, August
  - Logan, D. (2010) 'Real World Crash Investigations, Presentation to Glen Waverley Secondary College, Melbourne, October
  - Logan, D. (2010) 'Real World Crash Investigations, Presentation to Paramedic Students, Monash University, Peninsula Campus, Melbourne, October
  - Logan, D. (2010) 'Strategy development for the Northern Territory Workshop', Presentation to The Northern Territory Strategy Development Committee, Darwin, 22 March
  - Logan, D. (2010) 'What works in road safety? Effective road safety initiatives arrive alive 2008-2017', Presentation to VicRoads Community Representative Group, VicRoads, Melbourne, 26 October
  - Mulvihill, C. (2010) 'A Comparison of Rider Attitudes and Behaviours between Crash Involved and Non-crash Involved Returned Motorcyclists', Australasian Road Safety Research, Policing and Education Conference, Canberra, 2 September
  - Mulvihill, C. (2010) 'A Comparison of Rider Attitudes and Behaviours between Crash Involved and Non-crash Involved Returned Motorcyclists', 8th International Motorcycle Safety Conference, Cologne, 4 October
  - Mulvihill, C. (2010) 'Development, Delivery and Evaluation of an On-Road Assisted Ride Program', Victorian Motorcycle Advisory Council, VicRoads, Melbourne, 20 May
  - Mulvihill, C. (2010) 'Development and Delivery of the VicRide On-Road Coaching Program', Victorian Motorcycle Rider Trainers and Stakeholders, VicRoads, Melbourne, 21 June



**Christine Mulvihill**  
BBSc(Hons)  
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**Sujanie Peiris**  
BSc(Hon), BE(Hon)  
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**Anna Devlin**  
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**Catherine Healy**  
BA  
Research Assistant

**Effie Hoareau**  
GradDip(Stats&OpRes),  
BSc, Research Fellow



**Professor Brian Fildes**  
PhD, CProdE, BSc (Hons)  
Professor

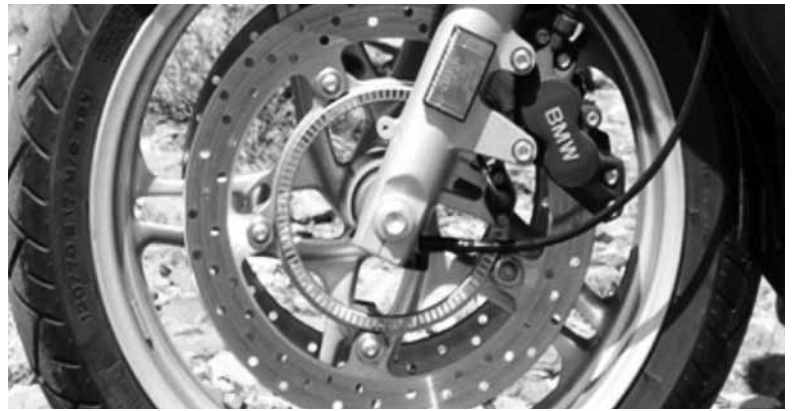


**Cathy Crupi**  
BComm (Hons), DipLanguages  
PA to Professor Brian Fildes



**Matteo Rizzi**  
MEng, MTrans  
PhD candidate

# MUARC Europe (Prato)



## Research

Several existing projects were completed during 2010.

**AIMSS Stage 2** – This study set out to describe a method for evaluating the benefits of new safety technologies for use in motor racing in Australia and associated regions. A confidential report was prepared and submitted to Australian Institute for Motor Sport Safety in Australia and the FIA in Europe, outlining how any new safety features in racing vehicles could be evaluated.

**LAB** – Reports were completed for the Laboratory of Accidentology and Biomechanics in France on technology evaluation, injury severity scoring and Harm analyses. These confidential reports were aimed at assisting LAB in knowledge about safety assessment and active safety.

**MUNDS Feasibility** – This feasibility study was undertaken to illustrate how new safety technologies could be evaluated faster, using an innovative and novel approach. The benefit of Electronic Stability Control was computed to validate the method and the results confirmed that the approach

was technically sound and capable of providing more rapid assessments of new vehicle technology savings in fewer crashes and occupant injuries.

**Enhanced Braking Stage 1** – A preliminary study was undertaken for the Swedish Transport Authority examining ways in which vehicle braking could be improved beyond current levels of vehicle deceleration. The ongoing study highlighted several ways in which vehicle braking could be enhanced to achieve decelerations beyond 10m/s<sup>2</sup> for the passenger car fleet with the need for further research into a

number of related issues to demonstrate its real-world effectiveness.

### Benefits of ABS for Motorcycles –

A review of Antilock Braking Systems (ABS) was undertaken in collaboration with Dr Jennie Oxley at MUARC Malaysia. ABS is thought to positively impact upon serious motorcycle accidents in Australia and elsewhere, and the study set out to explain the technology and the benefits already reported on its effectiveness at preventing crashes and injuries. The reported analyses uncovered were quite limited and it was clear that further research was warranted in terms of the extent and prevention mechanisms of this technology.

### Collaborations and Partnerships

MUARC Europe set out to work collaboratively with other research organisations in Europe to enhance available resources and ensure that its activities were focussed on critical issues in the region. Several Memorandum of Understanding agreements were established with various safety research centres in Europe to achieve this aim and a number of joint submissions were prepared and submitted for safety projects during 2010. This activity is expected to continue over the next few years as MUARC Europe demonstrates the value it can add to European consortiums in providing additional resources and expertise to those currently available.

MUARC involvement in safety research support currently includes involvement with other safety groups based in the UK, the Netherlands, France, Sweden and Italy. This work is ongoing and plans are in-hand to expand these collaborative activities beyond research projects into teaching and education activities in road safety for academic and industry participants.

The first meeting of a newly formed Collaborative Research Network (CRN) among MUARC Europe partners was held in Paris, France in February. This involved research centres and government participants from Sweden, France, Germany, UK, Italy and Australia. Discussions focused on areas and topics of mutual interest and importance, where the CRN could make a significant input.

### Teaching and Education

MUARC Europe successfully enrolled its first PhD student based at the Prato Centre. Mr Matteo Rizzi (Italian born and educated in both Italy and Sweden) is a Road Safety Analyst at Vectura Consulting in Sweden and has already published articles. He commenced his studies early in 2010 as an external part-time candidate at MUARC and as an enthusiastic motorcyclist, has chosen to study the causes of motorcycle crashes and countermeasures.

It is also planned for MUARC Europe to become more involved in graduate teaching programs in the region with universities in Florence and the UK. These courses are likely to involve both coursework and research activities in road safety to ensure an continuing supply of qualified practitioners in research, policy and intervention expertise in the future.

Professor Fildes continues to work as an Associate Supervisor to Professor Amrik Sohal within the Monash Faculty of Business and Economics for another external part-time PhD student examining the Management of Transportation Infrastructure Projects in United Arab Emirates. Associated with this, a number of lectures have been given to students and other interested participants on research methodologies and issues.

### Working with Local Communities

One of the benefits that MUARC Europe can offer is to work with the local community on helping them achieve real societal benefits from rigorous scientific

research and best practice solutions to priority safety problems. MUARC officers have met with the local Commune and Provence on the development of a Strategic Safety plan for the region. While development has been slow given changes in government and councillors, steady progress towards this objective has been achieved during 2010.

Productive meetings have been held with the Automobile Club of Italy (ACI) on obtaining access to national and local road crash databases, necessary to help the local community identify the scope and details of the safety problem in Italy. Consequently, a number of joint papers have now been prepared and published at local and European meetings, showing the problems to Vulnerable Road Users in the area.

### Outputs

The focus of MUARC Europe activities has been primarily based on establishment and building resources and partnerships. It has been a successful year in this respect, evidenced by the research, collaborations and teaching achievements. Valuable lessons have been learned in terms of the process necessary to establish an international satellite research activity and the time and needs required in setting up such a successful venture.

Academically, a number of client reports and peer-reviewed conference and journal papers have been prepared and published during 2010 based on activities undertaken by MUARC Europe.



Ponte Mercatale, Prato (river Bisenzio).



**Dr. Jennie Oxley**  
PhD, BSc (Hons)  
Associate Director



**Roszalina Ramli** BDS (Malaya),  
MSc in Oral and Maxillofacial Surgery (London), FDSRCS(Eng), FFDRCS (Ire)



**Anne Jamaludin**  
GDPH, MPH Public Health  
Research Associate



**Su Mei Lee** BCom  
Administrative Officer

# MUARC Malaysia



MUARC Malaysia has developed and expanded in 2010, achieving some significant milestones. With the support of MUARC Melbourne and the Sunway Campus, we have made strong advancements in developing the office as a key injury prevention research facility in Malaysia and the Asian region. In 2010, the continued growth of MUARC Malaysia was evidenced in three major areas of development including i) engagement with local groups, ii) funding of research activities, and iii) capacity building.

## Establishing Networks

Engaging local groups to both support research activities financially and to collaborate as research partners has been an important step in establishing MUARC Malaysia. The office has continued to expand our collaborations with government, local organisations and stakeholders involved in various injury prevention activities. Establishing these solid networks has ensured a strong presence in the

region, fostered clear partnerships and success in attracting funding sources.

Successful partnerships have been formed with government, industry and universities including:

- Government departments: Ministry of Transport, Ministry of Health, Social Security Organisation, National Institute of Sport, Ministry of Women, Family and Community Development, Royal Malaysian Police, Office of Road Safety, Malaysian Institute of Road Safety (MIROS), Australia-Malaysia Institute, Standards and Industrial Research Institute Malaysia, Johor State Investment Centre.
- NGOs and Industry: UNICEF, Malaysian Global Road Safety Partnership, Federation of Malaysian Manufacturers, AAA, Shell Malaysia, Perodua, Proton.
- University and other research groups: Hospital Universiti Kebangsaan Malaysia, Centre for Vehicle Technology, Universiti Tunku Abdul Rahman; Iskandar Malaysia UTM Research Centre (IMREC) and Universiti Teknologi Malaysia

(Johor), National Trauma Database and Sungei Buloh Trauma Hospital; General Hospital KL, Universiti Putra Malaysia, Universiti Sains Malaysia, University Malaya, Sunway Campus researchers (Schools of Medicine and Health Sciences, IT and Engineering), Monash Australia researchers (e.g., Child Abuse Prevention Research Australia, Department of Occupational Therapy).

## Research Projects

In conjunction with establishing research partnerships and collaborations, key activities of the office have been to attract funding to undertake research projects. We were successful in attracting external and internal funding sources for the following projects:

**Keeping children safe in vehicles (Sunway Campus Internal Grant):** Given the high level of road trauma in Malaysia, especially involving children and youth, and poor seat-belt and helmet use, this project

aims to address issues of child protection in vehicles. More specifically, through observational and survey techniques it aims to assess the contribution of non-wearing rates on crash and injury risk, understand the extent of the problem and examine parental attitudes and behaviour regarding restraint and helmet use for their children. The outcomes of this study will be a set of recommendations for development of effective countermeasures.

**Motorcycle-related crashes amongst children (Australia-Malaysia Institute and Universiti Kebangsaan Internal Research Grants):**

In Malaysia, the motorcycle is a widespread family mode of daily transport and it is common to see a number of children riding as pillion passengers with their parents and older siblings (with or without helmets). Moreover, the number of children killed or seriously injured as a result of a motorcycle collision is high. This study sets out to understand more fully the contributing factors to child injuries as a result of a motorcycle crash, by examining hospital records and interviewing parents of a sample of children admitted to hospital. The results of this project will help guide the development of effective countermeasures to reduce serious injuries to children on motorcycles.

**Video production on workplace safety issues (SOCSCO and FMM):**

Videos have been widely distributed to large companies and industries in Malaysia as part of training programs. These activities, in partnership with SOCSCO, FMM and the Sunway Occupational Health and Safety Branch, involved the production of three educational videos targeting employees. The videos addressed three priority areas of workplace injuries in Malaysia, following examination of claims data and developed to raise the awareness of issues amongst employees and provide strategies and tips for improved policies, practices, behaviour and environments in the workplace.

Video 1: Slips, trips and falls in the workplace

Video 2: Commuter motorcycle collisions

Video 3: Hazardous chemicals

**Contributing factors to young driver/rider crash risk (MIROS):** Malaysian road fatality statistics show that young drivers and riders between 16 and 25 are over-represented in fatal crashes compared with older age groups. While the international literature

has clearly established an understanding of the predominant risk factors, very little is known about these factors in middle-income and developing countries. The aim of this project, therefore, is to examine the contributing factors to young driver/rider crash risk using a case-control study design to provide essential information to guide and inform countermeasure development to improve young driver/rider-related trauma.

**Contributing factors to child pedestrian collisions (Ministry of Higher Education, Fundamental Research Grant Scheme):**

Pedestrian trauma makes up approximately 15% of all road fatalities in Malaysia. In 2007 alone, over 3000 people were involved in a police-reported pedestrian crash. Children as pedestrians are an extremely vulnerable road user group and the Malaysian government recognises the importance of teaching young children to interact in traffic appropriately and introduced nation-wide school-based educational programs. Our population-based case-control study aims to identify the risk factors for pedestrian crash and injury risk among Malaysian children. The findings will provide the evidence base required for improved management of child pedestrian crashes, guiding improved and innovative countermeasures to reduce the personal and economic costs of child pedestrian crashes.

**Capacity Building**

MUARC Malaysia's capacity building activities remain a core undertaking at the centre and have continued in 2010, when we welcomed two new staff members. Ms Anne Jamaludin joined our team as a Research Associate. She holds a Masters of Public Health (University of Adelaide), has previously worked at the Ministry of Health and UNICEF Malaysia. Ms Su Mei Lee also joined the team late 2010 as the Administrative Officer (joint position between MUARC Malaysia and Research Office, School of Engineering).

Our teaching programs are also integral activities of the office. Dr Roszalina Ramli is continuing her PhD candidature and made significant progress during the year. This study examines issues contributing to motorcycle injuries, particularly the effect of helmet design and wearing rates on craniomaxillofacial injuries, using a prospective case-series study design of

injured motorcyclists presenting to major hospitals in the Klang Valley. Data collection activities have run throughout 2010 and are expected to continue through the first few months of 2011. (Supervisors: Prof. Rod McClure, Dr Jennie Oxley, Dr Peter Hillard & Prof. Farhan Sadullah)

Ms Saraswathy Venkataraman is also joining the team as an HDR student. Her application for PhD candidature was approved late 2010 and she will commence studies early 2011. Saraswathy has a background in Occupational Therapy and her research interests are in falls in the elderly. Her proposed research program will examine the risk factors of falls and long-term consequences amongst the elderly, particularly those living in shelter homes in the Klang Valley. Functional performance and quality of life will be examined with the view to develop effective rehabilitation programs. (Supervisors: Dr Jennie Oxley, Prof Louise Farnworth & Dr Lesley Day).

In addition, we are co-supervising an Honours student at the Faculty of Medicine and Health Sciences, Universiti Putra Malaysia (main supervisor: Dr Kulanathan K. C., Mani). Ms Balqis Wan is examining the association of body mass index, sleep quantity and quality with sleepiness amongst truck drivers in Malaysia. This honours research component is due for completion early 2011.

Encouragement and promotion of MUARC's HDR research program continues and the Malaysia office supports ongoing applications to undertake HDR candidature. Activities have been undertaken to achieve this including contributions to short courses, minor undergraduate research projects, and presentations to various organisations.

**2011 and beyond**

MUARC Malaysia has made good inroads in 2010 to consolidate itself as a collaborative injury prevention research unit in Malaysia, undertaking funded research activities in priority injury prevention areas in Malaysia and the region. This will continue and expand in the coming years. The goals for MUARC Malaysia in 2011 and beyond are to consolidate progress with the aim of becoming a fully functional, self-sustaining research centre comprising long-term research partnerships with local organisations and stakeholders, as well as translating these collaborations into large-scale research programs.



**Dr. Michael Fitzharris**  
BA, BSc(Hons)(Psych), PhD  
Associate Director



**Maatje Scheepers**  
BA (Psych & Comm), BA (Hons)(Psych), MA  
Research Fellow

# MUARC South Africa



Since its establishment in mid-2008 on the Monash South Africa campus at Ruimsig (Johannesburg), the Injury Prevention and Safety Promotion (IPSP) Research Node has actively developed collaborations throughout southern Africa. Activities have focussed on evidence-based road safety research and data systems strengthening.

The IPSP has continued to receive significant support from the Deputy Pro-Vice Chancellor of Research, Associate Professor Dina Burger, and Monash South Africa more broadly.

With the support of MUARC, the Research Node aims to conduct health and injury prevention programs aligned with the Millennium Development Goals and the UN 2011-2020 Decade of Action for Road Safety. Capacity building through the delivery of short courses and the supervision of higher degree students remains a core goal.

## Research Activities and Collaborations

The year 2010 represented the second full year of operation of the Node. Activities focussed on strengthening relationships

with road safety partners in sub-Saharan Africa and continuing to build recognition of the activities of the Node and Monash South Africa.

In line with the IPSP Mission Statement, the activities of the Node extended well beyond the borders of South Africa, reflecting the broader purpose and student constituency of the Monash South Africa campus.

### Monash Africa Centre Road Safety Forum

In seeking to reduce those killed in road accidents in southern Africa, the Monash Africa Centre brought together key stakeholders from South Africa, Tanzania, Namibia, Swaziland and Botswana, at an international Road Safety Forum held on the 19 October 2010.

The forum aimed to set a path to tackle pressing issues and seek solutions to the major road safety questions confronting sub-Saharan Africa today. The forum was set in the context of the UN 2011-2020 Decade of Action for Road Safety and the projected 127% increase in the number of persons killed in Africa by 2030. This is especially important as currently Africa has

among the highest road death and serious injury rates in the world, with 32.2 deaths per 100,000 persons. This is contrast 10.3 deaths per 100 000 persons in high-income countries. Expressed another way, Africa has 2% of the world's registered vehicles and 18% of all road accident-related deaths.

Discussions focussed on supporting the implementation of the principles of the Decade of Action, which is underpinned by the Safe Systems approach to road safety. Delegates actively engaged in the symposium, outlining a range of actions, barriers and solutions. Building road safety capacity, strengthening data systems and implementing road safety management plans among industry were recognised as the key platforms upon which the five pillars (i.e., road safety management, safe roads and mobility, safer vehicles, safer road users, post-crash response) of the Decade of Action could be built.

Organisations represented included: the Global Road Safety Partnership; the South Africa Road Traffic Management Corporation; the Botswana Road Accident Fund; the Botswana Police Service; the Ministry of Infrastructure Development and

the Ministry of Home Affairs of Tanzania; the MRC-University of South Africa Lead Program on Crime, Violence and Injury; BHP-Billiton, and the Swaziland Motor Vehicle Accident Fund.

### **MUARC hosts the African National Congress (ANC) Secretary General**

As part of a visit to Monash University co-ordinated by the Australian Department of Foreign Affairs and Trade Special Visits Program, the ANC Secretary General, Mr Gwede Mantashe and his delegation visited MUARC in October. The research of MUARC and its applicability to the road safety challenges faced by South Africa were outlined. The visit concluded with a tour of the driving simulator.

### **Program in South Africa**

Following the 2009 Memorandum of Understanding (MOU) with the South African Medical Research Council and the MRC-University of South Africa Lead Program on Crime, Violence and Injury, Monash was invited to co-present a road safety short course with UNISA and the Indian Institute of Technology – Delhi. The week long course Injury Control and Traffic Safety Training Course: Making Traffic Safety A Reality - 2010 and Beyond was held in Kliptown (SOWETO), Johannesburg, between 24 - 28 May. The course attracted over 40 delegates from South Africa, Namibia, Botswana, Mozambique and Egypt. Course instructors included Professor Dinesh Mohan, Dr Olive Kobusingye, Professor Mohamed Seedat and Professor Rod McClure.

2010 also saw the IPSP become members of the Global Road Safety Partnership of South Africa (GRSP-SA). The GRSP play an active role in furthering road safety in South Africa in particular.

### **Program in Tanzania**

Following the signing of the Memorandum of Understanding with the Ministry of Home Affairs, the development of the research program remained the core focus, particularly in the area of coronial data systems and casualty crash data

systems strengthening.

With strong relationships with the Ministry of Infrastructure Development, MUARC in Australia hosted a delegation of Tanzanian visitors in April. The delegation was exposed to an intensive road safety program on road safety research and evaluation methods. As part of this week-long program, visits to MUARC's road safety stakeholders were organised.

### **Program in Botswana**

This year saw the development of a longitudinal study of the association between road laws and regulations and road traffic crashes. An early part of this project was presented as a poster titled Reducing the road toll in Southern Africa through knowledge transfer and regulatory intervention at the Safety 2010 World Conference, London, 21-24 September. Further data collection and analysis is in being undertaken.

Project partners include the University of Botswana Trauma Working Group (Dr Andrew Kestler, Dr Miriam Sebege) and the Botswana Police Service (Mr. Brunoh Paledi, Director, Traffic Division). The program in Botswana was developed with the support of a Monash University International Strategic Grant, awarded to Dr Diana Bowman, Faculty of Law, Monash University and Dr Fitzharris.

### **Program in Namibia**

The IPSP received a grant from the Motor Vehicle Accident (MVA) Fund of Namibia to conduct an injury surveillance program in four hospitals in Windhoek during the Festive Season (December 2009 – January 2010) with the focus being all presentations to the Emergency Department. The project included the examination of pre-hospital information, as well as the creation of a linked dataset from pre-hospital through the claim submitted to the MVA Fund. The project served to highlight current injury prevention priorities and served as the basis for health data systems strengthening.

The report, Multi-centre road crash injury surveillance study in Namibia – Phase 1: The December 2009 Pilot Study, was

launched on 9 November, with speeches from the Ministry of Health and Social Services and the Ministry of Works and Transport ensuring significant local media attention. It is anticipated that a number of higher degree students will be enrolled to further develop this program.

## **Public Engagements**

Presentations were given at the Joint 49th International Spinal Cord Society (ISCoS), 9th Asian Spinal Cord Network (ASCoN) and 10th Spinal Cord Society (SCS) Meeting in New Delhi, India on road crashes and spinal cord injury in Africa. Causes of spinal cord injury in Africa: gaps in data and the opportunities and challenges for improved data collection was delivered as part of a WHO-sponsored Injury Prevention Symposium.

Dr Fitzharris also delivered Road safety in South Africa: Issues in transferring best practice road safety knowledge and priorities for action presentations as part of the Monash South Africa Public Lecture Series in Johannesburg in September.

## **The way forward**

The goals for 2011 and beyond are to consolidate established relationships through joint research projects with the view of advancing road safety knowledge throughout the sub-Saharan region and to build the road safety policy evidence base locally. The enrolment of higher degree students and the continued development of short course and graduate programs remain priorities.

## **Staff Memberships of Boards and Committees**

- CHAIR, Chair, Road Traffic Crash Sub-Committee, Prevention Committee, International Spinal Cord Society
- Member, International Spinal Cord Society

*Far left: Monash Africa Centre Road Safety Forum delegates on the Monash South Africa Campus.*

*Left: Launch of the Namibia Multi-centre road crash injury surveillance program (Pictured: Mr Sidney Boois [Senior Manager: Accident and Injury Prevention], Ms Albertina Shifotoka-Mbango [MVA Fund Call Centre Team Leader], Ms Magdalena Natango [Director Primary Health Care: Ministry of Health and Social Services], Mrs Rosalia Martins-Hausiku [Acting CEO, MVA Fund], Dr Michael Fitzharris)*

# Research Training

MUARC is committed to research training for the development of new leaders in the field of injury prevention. PhD students at MUARC study in an energising and collaborative environment with a diverse range of highly skilled researchers and injury prevention practitioners.



**Dr. Judith Charlton**

PhD, MSc, Bed,  
MAPS  
Associate Director  
(Education and  
Research Training)

## Program Highlights

In 2010, MUARC welcomed five new postgraduate students, making a total of 22 PhD students enrolled through MUARC. The new students are:

- Matteo Rizzi, the Centre's first European-based student, who will study implementation of safety measures for PTW with a safe system approach
- Will Kerr, whose research will focus on level crossing safety
- Maggie Trotter and Miranda Cornelissen, both with the Human Factors team and will study different aspects of organisational resilience and safety, and
- Peter Richardson, whose research will investigate theory and practice in sports injury prevention.

MUARC also celebrated a record number of PhD completions during 2010. Five students graduated and two submitted their thesis for examination.

## Congratulations to MUARC 2010 graduates:

- Dr Virginia Routley – *Seat belt wearing in Nanjing and Zhoushan, China post regulation*
- Dr Eve Mitsopoulous-Rubens - *Calibration ability and the young novice driver*
- Dr Kristie Young – *Smarter than your average car? An examination of the effectiveness and acceptability of Advanced Driver Assistance Systems*
- Dr Fiona Clay – *Predictors of return to*

*work and work disability following injury*

- Dr Matthew Ericson – *Improving the process of technology transfer for better road safety policy outcomes in Cambodia and the Lao PDR*

The Centre encourages and supports students' participation in conferences as an important way to connect with experts in their field and to gather feedback on their own work. In 2010, Marilyn Johnson attended the 54th AAAM Annual Conference, in Las Vegas, US, where she presented a paper entitled 'Naturalistic cycling study: identifying risk factors for on-road commuter cyclists', which received a special mention as the runner-up best student paper.

MUARC candidates also make a significant contribution to the body of scientific evidence on safety issues and injury prevention through scholarly writing. In 2010, students authored 14 peer reviewed scientific publications based on their PhD research:

- Brodie, L. R., Bugeja, L. & Ibrahim, J. E. (2010) 'Coroners' recommendations following fatal heavy vehicle crash investigations', *Australian & New Zealand Journal of Public Health*, 34 (2), pp136-141
- Bugeja, L., Clapperton, A. J., Killian, J. J., Stephan, K. L. & Ozanne-Smith, J. (2010) 'Reliability of ICD-10 external cause of death codes in the National Coroners Information System', *Health Information Management Journal*, 39 (3), pp16-26
- Clay, F. J., Newstead, S. V., D'Elia, A. & McClure, R. J. (2010) 'First return to work following injury: does it reflect a composite or a homogeneous outcome?', *Occupational and Environmental Medicine* (67), pp730-736. Journal Impact Factor:3.643
- Clay, F. J., Newstead, S. V. & McClure, R. J. (2010) 'A systematic review of early prognostic factors for return to work following acute orthopaedic trauma', *Injury*, 41, pp787-803. Journal Impact

factor: 2.383

- Clay, F. J., Newstead, S. V. & McClure, R. J. (2010) 'A systematic review of early prognostic factors for return to work following acute orthopaedic trauma', *Injury*, 41, pp787-803. Journal Impact factor: 2.383
- Clay, F. J., Newstead, S. V., Watson, W. L. & McClure, R. J. (2010) 'Determinants of return to work following non life threatening acute orthopaedic trauma: a prospective cohort study', *Journal of Rehabilitation Medicine* (42), pp8. Journal Impact factor:1.882
- Clay, F. J., Newstead, S. V., Watson, W. L., Ozanne-Smith, J., Guy, J. & McClure, R. J. (2010) 'Bio-psychosocial determinants of persistent pain 6 months after non-life-threatening acute orthopaedic trauma', *Journal of Pain*, 11 (5), pp420-430. Journal Impact factor:3.578 Citations: 2
- Clay, F. J., Newstead, S. V., Watson, W. L., Ozanne-Smith, J., Guy, J. & McClure, R. J. (2010) 'Bio-psychosocial determinants of time lost from work following non life threatening acute orthopaedic trauma', *BMC Musculoskeletal Disorders*, 11 (6). Journal Impact factor:1.88.
- Edquist, J., Horberry, T., Hosking, S. G. & Johnston, I. R. (2010) 'Effects of advertising billboards during simulated driving', *Applied Ergonomics* (in press)
- Johnson, M., Newstead, S., Charlton, J., Oxley, J. (In press). "Riding through red lights: the rate, characteristics and risk factors of non-compliant urban commuter cyclists." *Accident Analysis & Prevention*.
- Johnson, M., Charlton, J., Oxley, J., Newstead, S. (2010). *Naturalistic Cycling Study: Identifying Risk Factors For On-Road Commuter Cyclists* *Annals of Advancement of Automotive Medicine (AAAM)*. 54, 267-274.
- Johnson, M., Charlton, J., Newstead, S., Oxley, J. (2010). "Painting a designated space: cyclist and driver compliance at cycling infrastructure at intersections." *Journal of the Australasian College of Road Safety* 21(3).

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## Candidates



### Lyndal Bugeja

BA (Hons Criminology)

Supervisors: Professor Joan Ozanne-Smith, Professor Joseph E Ibrahim (Department of

Epidemiology and Preventive Medicine) and Judge Jennifer Coate (State Coroners Office, Victoria)

### Determinants of coroners' recommendations on external cause death in Victoria, Australia

This study examined the frequency, nature and determinants of coroners' recommendations on external cause deaths in Victoria for the period July 2000 to June 2005. The research design comprised: a retrospective cohort study comparing recommendations cases to non-recommendations cases; in-depth analysis of recommendations cases; and key informant interviews. The findings showed that there were limitations with the frequency and formulation of coroners' recommendations when examined in accordance with the principles of injury causation and prevention.



### Fiona Clay

MSc, BSc, GradDip (Epi & Biostats), GradDip (Work Disability Prev)

Supervisors: Professor Rod McClure, Dr. Stuart

Newstead, Dr. Wendy Watson (NSW Injury Management Centre)

### The determinants of outcome following orthopaedic trauma

The study aims to identify and quantify the evidence for individual level determinants of persisting pain and return to work in a sample of Victorian workers who had sustained non-life threatening acute orthopaedic trauma leading to hospitalisation. A prospective cohort study was carried out with 168 patients recruited from four Victorian hospitals and followed up over a six-month period. Patients were surveyed about their occupation, recovery expectations, whether they had returned to work, whether they were experiencing pain and about their general health. In addition, information was collected about their injuries.

During 2009, multivariate analyses of prognostic determinants for persisting pain, return to work and the duration of time lost from work were carried out.

Significant long-term disability was reported, with only 68% of the sample being able to return to work during the first six months following the injury and 54% reporting the presence of persisting pain six months after the injury. Significant determinants of pain-related outcomes and return to work included psychosocial factors and physical factors. The application of different analytic approaches provided insight into the determinants of persisting pain and work disability as well as identifying areas for further research consideration.

The PhD was awarded in 2010 (NHMRC scholarship).



### Miranda Cornelissen

MSc (App Cog Psych), BSc (Psychology) Paastricht University, The Netherlands

Supervisors: Dr Michael Lenne and Dr Paul Salmon

### Assessing and improving the safety and resilience of complex sociotechnical systems

Varying performance is part of every day activities and work. Previous research within Human Factors has considered performance variability in the context of human error and violations, thus being a negative phenomenon. The contemporary approach on performance variability argues that performance variability can actually lead to positive outcomes. This means that the focus should shift from restraining variability to supporting and encouraging performance variability leading to positive outcomes, and discouraging performance variability leading to negative outcomes. It is argued that accidents in complex systems are due to the concurrence of

performance variability rather than simple system breakdowns. The PhD thesis will address the following research questions:

- How can organisations model, a priori, performance variability in complex systems?
- Given that performance variability can lead to positive and negative outcomes, how can organisations determine when performance variability will lead to positive outcomes and when to negative outcomes?
- If organisations can determine whether performance variability will lead to positive or negative outcomes; how can they encourage positive performance variability and discourage negative performance variability?



### Clay Douglas

BSc BE (Hons)

Supervisors: Professor Brian Fildes and Dr. Tom Gibson (Human Impact Engineering)

### Modelling far-side occupants in side impact crashes

Regulations and interventions to protect far-side occupants in crashes do not currently exist, despite these occupants accounting for over 30 per cent of the seriously injured persons and harm in side impact crashes. Furthermore, no suitable crash dummies or mathematical models have been developed to investigate far-side occupant dynamics during such a crash.

This study aims to develop and validate a computer model capable of mimicking human response in far-side impacts. The model will then be used to investigate the influence of seat belt properties, impact direction and potential countermeasures on occupant loading and injuries. This model may aid the improvement of safety features currently in vehicles.

The PhD falls under the umbrella of a larger study aimed at improving protection to far-side vehicle occupants. It is an ARC Linkage study involving a collaboration of universities in Australia and the US as well as industry partners GM Holden and Autoliv. (Australian Postgraduate Award (Industry))



### Matthew Ericson

MPHP, BEc (Hons)

Supervisors: Professor Ian Johnston and Emeritus Professor David Chandler (Monash Asia Institute)

### Improving the process of technology transfer for better road safety policy

### outcomes in Cambodia and the Lao PDR

Road safety interventions that have proven effective in developed countries are frequently less successful when transferred to developing countries. The objective of this research is to analyse impediments to successful transfer using case studies from Cambodia and Laos.

Three case studies analyse the practical policy problems of the technology transfer process. The first explores vehicle safety standards using the example of two-wheel tractors in Laos and Cambodia. The second examines whether canopies would protect passengers travelling in the cargo-area of pickup trucks. The final case study compares how motorcycle helmet-wearing programs are implemented in Cambodia and Laos. The PhD was awarded in 2010. (Monash University Accident Research Foundation Peter Vulcan Scholarship)



#### Richard Fernandez

BSc (Hons)  
Supervisors: Professor Joan Ozanne-Smith, Associate Professor

Raphael Grzebieta (Department of Civil Engineering), Associate Professor Nigel Wreford (Department of Anatomy and Cell Biology) and Dr. Lesley Day

### A novel approach to the prevention of fall induced hip fracture: the anatomical and functional basis to improve hip-fracture preventing devices

Hip fractures are one of the most serious health problems facing the ageing population today. There is substantial evidence to suggest that the majority of hip fractures are a result of a fall directly onto the 'greater trochanter', or top part of the thighbone. Furthermore, the risk of re-fracture following a second fall is very high.

The development of the external hip protector has served as a promising avenue for hip-fracture prevention; however, its effectiveness is limited by low wearer compliance in the target population. This PhD project investigates the feasibility of a novel implanted hip fracture-preventing device and also develops further specifications for a new generation of external hip protecting devices in an attempt to increase wearer compliance. The project includes an anatomical and surgical evaluation of potential implant sites, examination of hip musculature morphology using computed tomography and computer based imaging techniques and biomechanical testing of muscle tissue.



#### Robin Hutchinson

BSc(Behav.), BSc(Hons)  
Supervisors: Professor Tom Triggs, Dr. Simon Hosking (Defence Science and Technology Organisation) and Dr. Gavan Lintern (General Dynamics)

### Supporting lane change behaviour with an ecological interface

The high demands placed on drivers in the road environment can lead to errors in judgement and breakdowns in situation awareness. These deficits can lead to deleterious consequences. Lane changing is a particularly challenging driving manoeuvre because of the need to make simultaneous judgements concerning multiple vehicles located in polar directions. A variety of driver assist systems have been developed to aid the driver in monitoring the road and to alert the driver to potentially hazardous situations. While these systems have been demonstrated to generally have a positive impact on driving, they are still in their infancy and require further development.

Ecological Interface Design (EID) is an approach to display development that may offer solutions to some of the limitations associated with current driver support systems. The aim of this project is to develop EID for the automotive domain and to use the principles of EID to develop a driver assist system to support lane change behaviour. This project aspires to enhance the design philosophy behind the development of driver assist systems and thereby positively impact road safety. Naturalistic driving data is being analysed in order to better understand the dynamics of lane change associated headway. This information will inform the design of the interface. (Monash University Accident Research Foundation John Lane Memorial Scholarship)



#### Marilyn Johnson

MAppSocRes, BA(Hons)  
Supervisors: Dr. Jude Charlton and Dr. Jennie Oxley

### Cycling safety from the perspective of all road users

The aim of this research project is to identify strategies to improve safety for cyclists who ride on the road. Investigations have included a series of fixed point observational studies at intersections across Melbourne and the development of a new methodology that involves attaching a compact video camera to commuter cyclists' helmets to gain the cyclists'

perspective of riding on the road.

The final data collection stage was a national online survey that was completed by Australian drivers and cyclists. Findings have focused on cyclist and driver behaviours, how both groups use cycling infrastructure and an in-depth analysis of risk factors involved in collisions and near-collisions.



#### Jessica Killian

MSc (Repro), GradDip (ReproSci), BSc  
Supervisors: Professor Joan Ozanne-Smith and Professor Olaf Drummer (Department of Forensic Medicine)

### The correlation between forensic toxicology and unnatural death

Injury is an important public health problem and a major cause of death, particularly in young people. Drug induced impairment and interactions are known to cause an increased risk of mortality. However, the full extent of involvement across the whole range of injury deaths is mostly unknown.

Data on 7400 unnatural deaths reported to the Coroner in Victoria, Australia from July 2000 to June 2005 were extracted from the National Coronial Information System (NCIS) and cases with toxicology reports were analysed to determine the drugs, other than alcohol, detected at toxicology screening. Exclusion criteria were applied to minimize error in interpretation of the results.

Of the cases with attached toxicology reports (85%), half were positive for a drug. After exclusions, for example, of potentially post-injury administrations, the toxicological evidence indicates that benzodiazepines (24%), opioids (18%) and anti-depressants (14%) are the most frequently occurring in unnatural deaths. For all mechanisms, the most frequently detected drugs were at potentially poisonous and/or impairing concentrations in about 30% of cases. Drugs occurred most frequently in poisoning, fires/burns/scalds, intentional self-inflicted (ISH), and inflicted by other (violent) causes.

For the first time, with the use of NCIS, this study describes the extent of drugs involved in unnatural deaths in Victoria. Further research is needed to determine the risks and levels of impairment for the drugs detected. (Australian Postgraduate Award)



### Adam McKinnon

MIT, BA(Psych)

*Supervisors: Professor Joan Ozanne-Smith and Dr. Rodney Pope (Charles Sturt University)*

#### Optimising the utility of injury surveillance systems for injury control in active populations

The main objective of this project is to optimise the utility of injury surveillance systems for injury prevention in active populations. Expected outcomes of the research include: a qualitative examination of procedural and socio-cultural factors affecting injury surveillance systems in the Australian Army and the Victorian civilian community; the identification and evaluation of new methods of injury data analysis (e.g. statistical process control charts, data mining techniques) to facilitate injury prevention; and the examination of user preferences toward current and innovative modes of information dissemination adopted by an injury surveillance system.

The results of this research will be particularly important to the Australian Defence Force and the Victorian civilian community as well as broader application across injury surveillance systems worldwide. (Australian Postgraduate Award (Industry), Department of Defence)



### Eve Mitsopoulos-Rubens

BA, BSc(Hons)

*Supervisors: Emeritus Professor Tom Triggs and Dr. Mike Regan*

#### Calibration ability and the young novice driver

It has been proposed that deficiencies in calibration ability contribute to young novice drivers' high crash involvement. However, little direct and objective evidence exists of differences in calibration ability between novice and experienced drivers.

Calibration in driving can be defined as the ability to match task demands to one's own capabilities as a driver. Calibration involves comparison between capabilities and task demands to determine whether there is an undesirable mismatch that necessitates appropriate modification to one's driving behaviour to ensure that safety is not compromised. Prerequisites to effective calibration are an accurate knowledge of the demands imposed by the traffic system and of one's own capabilities as a driver.

The primary aim of this PhD research program is to explore the fundamental

differences between young novice and experienced drivers' calibration ability. The research involved a series of four experiments, three of which utilised the MUARC advanced driving simulator. In summary, differences in calibration ability were found between young novice and experienced drivers. However, the presence of differences was found to be largely contingent on the nature of the task at hand. The outcomes of this research served to provide a theoretical and methodological framework to guide further study into calibration in driving as it relates to young novice drivers and, in the process, to reconcile some of the issues that have limited further thinking in this area. The PhD was awarded in 2010.



### Lisa J. Molnar

MHSA, BA

*Supervisors: Dr. Jude Charlton and Dr. David W. Eby*

#### Self-Regulatory Practices by Older Adults

Self-regulation of driving (such as reducing one's overall driving exposure or avoiding specific driving situations) shows considerable promise as a strategy for helping older drivers compensate for functional declines and extend the time period over which they can safely drive. Study findings on the extent and nature of self-regulation have been mixed, due partly to differences in how self-regulation is measured, characteristics of study subjects, and inclusion of measures thought to influence self-regulation.

This research aims to better understand the process of self-regulation and how it relates to perceived and actual impairments in functioning, and other driver characteristics such as gender and driving confidence. The research will be conducted in two phases. In Phase 1, a questionnaire instrument to measure self-regulation was developed and pilot tested with a sample of 137 drivers age 70 and older in the United States. In Phase 2 which will commence in late 2010, outcomes from the instrument will be compared with objective driving data from instrumented vehicle monitoring of real-life, naturalistic driving, as part of a larger Australian study. (Partial support for this research comes from the Michigan Center for Advancing Safe Transportation throughout the Lifespan at the University of Michigan, United States).



### Damian Morgan

BA (Hons)

*Supervisors: Professor Joan Ozanne-Smith and Emeritus Professor Tom Triggs*

#### Risk factors for unintentional drowning at surf beaches

The PhD study identifies and assesses factors that contribute to the risk of drowning at surf beaches as well as providing estimates of exposure to that risk. Methods used include analysis of coronial data, observation of beach users, self report, and expert risk assessment. Data gathered in this study is used firstly to develop a predictive model of exposure to drowning risk, and secondly, to quantify the risk posed to beach users according to swimming ability, surf beach experience and beach conditions. Selected results are published in Injury Prevention, *The Journal of Science and Medicine in Sport*, and the *Australian and New Zealand Journal of Public Health*.



### Carlyn Muir

MA(SocSci), Psych(Hons)

*Supervisors: Dr. Judith Charlton, Professor Brian Fildes and Professor Joanne Wood (Department*

*of Optometry, Queensland University of Technology)*

#### Visual attention in hemianopic visual field loss: Application to screening for fitness-to-drive

Hemianopic visual field loss is blindness or reduction in one half of the visual field caused by damage to the visual pathways in the brain. There is limited evidence regarding the ability to drive safely with hemianopia, however some studies have suggested that hemianopic field loss may not impair driving ability enough to warrant licence refusal. Research suggests that individuals with hemianopic field loss appear to compensate for their deficit to varying degrees by employing altered scan paths and excessive fixation in the blind region. However, fixation does not necessarily imply attentional processing, therefore identifying whether these altered scan paths actually correspond to attentional processing in the blind region would provide evidence as to whether this is an effective compensatory strategy.

The primary aims of this PhD are to investigate the extent to which individuals with hemianopic field loss compensate on a visual attention task, and to investigate the relationship between performance on a visual attention task and cognitive and ►

## Research Training

vision tests commonly used in driving assessment. Outcomes of this research will be useful for developing a suitable screening assessment for visual fitness-to-drive in individuals with hemianopic field loss. Carlyn is due to complete her thesis in 2010. (Australian Postgraduate Award (Industry))



### Roszalina Ramli

BDS(Malaysia), MSc in Oral and Maxillofacial Surgery (London), FDSRCS(Eng), FFDRCS(Ire)

Supervisors: Professor

Rod McClure, Dr. Jennifer Oxley, Dr. Peter Hillard, Professor Ahmad Farhan Sadullah (MIROS)

### Effectiveness of motorcycle helmet for preventing craniomaxillofacial injuries

Malaysia is a rapidly developing country in South-East Asia. Motor vehicle ownership is dramatically increasing, as is the burden of serious injury and death related to Road Traffic Crashes (RTC). RTC have become one of the major causes of mortality and morbidity and the second leading cause of deaths in males (Malaysian Department of Statistics, 2009). For the past 10 years, motorcyclists have registered the highest road deaths compared with other road users. In 2005, motorcycle fatalities represented approximately 60% of the total road fatalities in Malaysia (Radin Umar, 2006). Head injuries had been shown to be the most frequent fatal injuries (Kraus, 1989) while facial injuries were shown to occur in one-fourth of all injured riders (Kraus et al, 2003). Moreover, facial injuries tend to occur simultaneously with head injuries (Tsai et al, 1995; Pang et al, 1999; Ankarath et al, 2002).

The aim of this study is to quantify the association between helmet wearing status and helmet design (controlling for impact speed and collision partner), and the incidence, distribution and severity of craniomaxillofacial injuries in motorcycle riders in Malaysia.

There are three components of this research. The first will involve a questionnaire on riding experience and behaviour and injury severity profile. The second will involve helmet analysis and finally, full crash investigation will be performed on a sub-set of participants.



### Peter Richardson

B App Sci (Hum Mov) (Hons) U Ballarat, B App Sci (Physio) Lincoln Institute Health Sciences

Supervisors: Professor

Caroline Finch and Professor Rod McClure

### Theory and practice in sports injury prevention research

The primary aim of this proposed study is to explore the relationship between theory and practice – how theory informs practice and practice informs theory – in sports injury prevention research. Sports injury prevention research, like many other fields, has experienced some difficulty translating empirical evidence-based theory into real-world practice. Historically portrayed as a ‘one-way’ knowledge transfer issue, the ubiquitous theory-practice gap has recently been conceptualised as a knowledge production problem, suggesting a mismatch between the strategies research and real-world practitioners use to deal with complexity, context and culture. ‘Critical’ and ‘soft’ systems perspectives will inform an ecological investigation of the interactions between theory and practice throughout the sports injury prevention research process.



### Matteo Rizzi

Meng, Genoa University, Italy; Mtrans, LinkÖping, Sweden

Supervisors: Professor

Brian Fildes and Adjunct

Professor Claes Tingvall

### The implementation of safety measures for PTW with a safe system approach

The PhD research program will aim at understanding this sequence of events in motorcycle crashes. Critical factors in fatal motorcycle crashes will be analyzed with a Safe System approach in order to identify and recommend solutions at the various critical points leading up to crash prevention and injury mitigation. Possible research questions to be explored include:

- What are the critical factors leading to a motorcycle crash and motorcyclist injuries?
- How can a Safe System approach be applied to PTW?
- What countermeasures shall be adopted to break the chain of events before a crash occurs and to mitigate injuries?
- Are existing countermeasures sufficient to guarantee safe motorcycle journeys according to the Safe System approach?



### Virginia Routley

MPH, GradDip(SocStats), DipEd, BEc

Supervisor: Professor Joan Ozanne-Smith

### Development of seat belt wearing in two cities in China

In response to China's rapidly developing economy, motorisation and increasing road traffic fatalities, the Chinese national road traffic safety law, requiring seatbelts to be worn where fitted, became effective in May 2004. The research program aimed to evaluate comparative changes in seatbelt wearing patterns in the contrasting Chinese cities of Nanjing, Jiangsu Province and Zhoushan, Zhejiang Province in 2005-07 and compare with the successful development of seat belt wearing in Victoria, Australia in 1970.

Following traffic familiarisation and piloting, roadside observations of urban seatbelt wearing were undertaken for 68,992 vehicles and 118,607 occupants. To interpret these results 2200 occupant interviews, 10 focus groups and media reviews were conducted. The PhD had been a thesis by publication and to date six journal articles have been published and a final article is still under review. The PhD was awarded in October 2010.

The main published results of the observation and interview surveys are as follows. Seatbelt wearing was observed as being significantly higher for drivers (49.9% Nanjing, 47.4% Zhoushan) than for front seat passengers (9.1% Nanjing, 1.0% Zhoushan) and virtually non-existent for rear passengers. Wearing generally declined



Virginia Routley, who won the Vice Chancellor's award for excellence for her thesis, with supervisor Professor Joan Ozanne Smith on graduation day.

significantly each year. An absence of child restraints and belt tampering, a practice of 12-15% of taxi drivers, was observed. Interviewed drivers reported that seatbelts were fitted in almost all front and less than 50% of rear seats. Reasons for 'never wearing' were most commonly 'feeling trapped and uncomfortable'; for regular wearers 'feeling safer' and 'not wanting to be fined'. Focus group participants mostly agreed on the need to wear seat belts on highways in the front seat but not in the rear seat. There was lack of agreement on the need to wear seat belts for slower city traffic.

The research has indicated a need in China to promote awareness that injury can occur at low speeds, to enforce correct wearing for taxi drivers and to consistently regulate and report on front passenger seat belt wearing requirements. Development of wearing habits should be facilitated by consistent, visible and sustained enforcement. Rear seat belts fitted in increasing numbers of post 2004 manufactured vehicles should assist enforcement for all seating positions.

The World Bank Global Road Safety Facility funded the second and third year research costs of this project. An Australian Postgraduate Award funded the candidate.



### **Carolyn Staines**

BSc(Hons)

*Supervisors: Professor Joan Ozanne-Smith and Professor Graeme Davison (School of Historical Studies, Faculty of Arts)*

### **The Victorian experience of drowning and its prevention: historical eco-epidemiological study of drowning prevention in an economically developing community**

Victoria, along with other economically developed communities, has had considerable success in reducing drowning death rates. However, drowning continues to be a major cause of unintentional injury deaths in developing countries. This study aims to inform drowning prevention in developing countries by determining how Victoria reduced its drowning rate.

The study investigates the causes of drowning deaths and the patterns of change by reviewing the records of a sample of almost 1500 coroners' inquests dating from the 1860s to the 1970s. This research, supplemented by additional information from other historical sources and newspaper archives, is producing a rich picture of the drowning risk profile of Victoria's early settlers and the evolution of

this over the period of the state's economic and social development. (Monash Research Graduate Scholarship)



### **Karen Stephan**

GradCertBiostats, MPH, BSc(Hons)

*Supervisors: Dr Stuart Newstead, Dr Michael Lenné*

### **Crash risk and driver behaviour in complex urban settings: effect of road design and surrounding environment**

NRMA-ACT Road Safety Trust Postgraduate Scholarship.

This research is designed to investigate the effect of the design of the road and the surrounding environment (including speed limit) on the risk of a crash occurring. The first component of the project involves using statistical modelling techniques to identify the characteristics of the road design and surrounding environment that impact on the risk of a crash occurring. Identifying these characteristics will lead to the development of countermeasures. The second component of the research involves conducting experiments in the MUARC driving simulator to determine how driver behaviour changes in the presence of risk factors identified during phase one and to evaluate potential countermeasures. The focus of the research will be on complex urban environments, in particular, strip shopping centres.

This project will identify road design and environmental factors that affect crash risk in complex urban environments and recommendations for the design of urban environments to reduce crash risk. The results of this research may also contribute to more effective methods for setting speed limits. At a broader methodological level, the research will contribute to developing a rigorous scientifically valid process for measuring crash risk using real world data and the evaluation of countermeasures developed as a result of these models, which can be applied to any road environment.

In 2010, Karen travelled to London, UK to attend the Safety 2010 World Conference and to Lyon, France to visit the French National Institute for Transport and Safety Research (INRETS).



### **Maggie Trotter**

BA (Psych) (Hons) U Otago, NZ

*Supervisor: Dr Mike Lenne and Dr Paul Salmon*

### **Organisational resilience: a new model and study methodology**

Improvisation and other forms of performance variability have long been viewed as detrimental to safety; potential sources of risk and of violations to be prevented or controlled. In more recent times, however, there has been increasing interest in the positive potential of variability in human performance, and hence, of improvisation, particularly within the burgeoning field of Resilience Engineering. Improvised responses have the potential to enhance an organisation's resilience or to worsen a situation. Thus, organisations are faced with a dilemma: do they encourage improvisation and in so doing enhance their potential to survive system failures or disruptions, or do they discourage improvisation and save themselves from any potential negative safety outcomes it may produce? This dilemma would be made easier if organisations were able to enhance the likelihood that improvisation would effectively result in positive safety outcomes. To do so it would first be necessary for organisations to have a comprehensive understanding of improvisation and the factors that influence it. Currently there is no conceptual model of the factors that influence individuals' ability to improvise. Initially taking the domain of led outdoor activities (LOA) as a focus, this thesis aims to explore the factors that influence improvisation in order to develop a comprehensive conceptual model of these factors. By understanding the relationships between improvisation and its influencing factors it will be possible for organisations to determine ways to support appropriate, effectiveness improvisation so that, when faced with novel, safety critical situations individuals, team, or organisations, can improvise in appropriate ways that will prevent or minimise harm to any individuals within the system.



### **Trang Vu**

MPH, MHSc

*Supervisors: Dr. Lesley Day, Assoc. Professor Terry Haines and Professor Caroline Finch*

### **Fall prevention in community-living older people affected by co-morbidity: a targeted approach**

The thesis research examines the effects ►

## Research Training

of co-morbidity on hospital resource use by community-dwelling older people hospitalised due to falls using the Victorian Admitted Episodes Dataset for fiscal years 2005–06, 2006–07 and 2007–08. The presence of co-morbidity has been found to influence health care resource utilisation and costs by a number of studies involving a diverse range of populations including people with trauma, hip fractures and diabetes mellitus. This finding has financial implications for resource-constrained health systems. It is this excess economic burden beyond what might be expected based on the primary diagnosis that this thesis will aim to investigate. The thesis will seek to demonstrate the potential value of a targeted risk reduction approach focusing on older people with co-morbidity. (Australian Postgraduate Award)



### Linda Watson

BSc(Hons)

Supervisors: Dr Lesley Day,  
Dr Stuart Newstead

### Dog bite injury: an investigation into the effectiveness of regulation

In recent years, many State regulations in Australia have focused on restricting particular breeds, despite there being sparse scientifically sound evidence to suggest that the targeted breeds feature disproportionately in dog bite injury statistics. Within Australia there are no reliable statistics available on the breed of dogs involved in injury events, mainly because breed identification based on phenotype is reported to be inaccurate, even when experienced observers

are involved. Further, accurate breed denominator data are not available to allow estimation of breed specific bite injury rates. The effectiveness of breed specific regulatory measures has not been clearly demonstrated, nor has any literature been identified where this approach has been examined for potential harmful effects. The evaluation of injury interventions is critical to ensure that health gains are made and finite public resources are used effectively. Breed specific regulatory measures may reflect a simplistic and unrealistic appreciation of the causal factors.

It is well recognised that a dog's reaction in any situation depends on at least six interacting factors including heredity, early experience, socialisation and training (or lack of), health (medical and behavioural), current environment and victim behaviour. Current breed specific regulation removes responsibility for dog-biting incidents from dog owners and places the focus on dogs. It may also engender a false and dangerous perception that breeds not included will not show aggression. A fundamental principle of injury prevention is that the most effective solutions involve a multi-dimensional approach, which in the instance of dog bite injury would involve dog owners, parents, children, the general community, local authorities and legislators.

This thesis will examine these issues relating to breed specific regulatory interventions, within a conceptual framework based on established injury prevention and health promotion principles using the Australian and Victorian context. (Monash Graduate Scholarship)

## MPhil candidate



### Will Kerr

BSc (Erg) (Hons) U

Loughborough, UK

Supervisor: Dr Michael  
Lenne

### Review of level crossing data

The responsibility for rail safety in Australia is shared by government and industry. As part of this process of shared responsibility, industry reports rail safety occurrences to the regulators. The regulators and operators use this data to assist with their safety analyses and programs. Rail regulators provide data to the Australian Transport Safety Bureau (ATSB) for national publications. In April 2010, the ATSB released the Australian Rail Safety Occurrence Data from 1 January 2001 to 31 December 2009. In this period there were 654 reported collisions with road vehicles at level crossings. While the Australian Rail Safety Occurrence Data published by the ATSB suggests that level crossing safety is improving, it does not provide a sufficient evidence base and as it currently stands there is no clear understanding of what is happening, who it is happening to, where it is happening, when it is happening, why it is happening or what countermeasures are effective. As a result the ATSB has established a research investigation with the aim of collating level crossing accident, incident and assessment data to provide an evidence base for further research and to improve the understanding of level crossing accidents and ultimately the improvement of level crossing safety. In summary, the conduct of this research will enable detailed national level crossing occurrence data to be collected and analysis of this data to be performed to provide an evidence base and potentially recommended where resources may be best targeted to reduce the risk of level crossing occurrences.

## Staff candidates



### Jim Langford

MEdSt, BA(Hons)

### To assess and manage older drivers' crash risk

The mainstay of the thesis is a series of peer-reviewed publications, consisting of:

- an examination of older drivers' distinct crash and driving patterns, especially to identify different exposure aspects and characteristic risk factors



Jim Langford's PhD is looking at older drivers' crash and driving patterns.

- an evaluation of older drivers' extent of crash involvement, their responsibility for crashes and the extent to which they represent a risk to other road users
- an evaluation of licensing authorities' and others' options for determining older drivers fitness to drive, including detailed examination of the commonly used assessment protocols
- the presentation of promising countermeasures aimed at maintaining acceptably safe driving. These countermeasures have been based on Safe System principles and include more accurate targeting of at-risk older drivers, more strategic licensing options, the promotion of more crashworthy vehicles and improved highway design tailored to older drivers' needs

Work is currently proceeding to develop a literature context within which the findings from the above series of papers can be discussed.



**Kristie Young**  
BAppSc(Psych)(Hons)  
**Smarter than your average car? An examination of the effectiveness and**

#### **acceptability of Advanced Driver Assistance Systems**

The wide-scale implementation of Advanced Driver Assistance Systems (ADAS) has great potential to improve driver behaviour and reduced the incidence and severity of road trauma. However, the introduction of such automated systems into the vehicle will also fundamentally change the driving task, sometimes in ways that were not intended by the system designers or implementers. Given these issues, evaluating the potential safety benefits afforded by these technologies, as well as their acceptability and any unintended consequences of their use, are critically important. This thesis aims to generate a greater understanding of the impact of introducing advanced driver support technologies into the vehicle by examining the short- and long-term benefits of various ADAS, as well as identifying any unintended negative consequences of these technologies, including over-reliance, increased workload and distraction. A further aim is to examine the acceptability of ADAS to drivers and identify any barriers that exist to their acceptance at an individual and community level. Kristie was awarded the degree of PhD in 2010.

### **2010 Co-supervised PhD candidates from other faculties and institutions**

MUARC staff also co-supervise PhD candidates who are enrolled in other Monash faculties and departments as well as other Australian and overseas institutions.

#### **Monash University candidates**



**Kelly Bryden**  
DPsych (Clinical Neuropsychology)  
School of Psychology and Psychiatry, Faculty of Medicine, Nursing and

Health Sciences, Monash University  
*Supervisors: Dr. Judith Charlton (MUARC), Dr. Jennie Oxley (MUARC) and Dr. Georgia Lowndes (Psychology)*

#### **Wayfinding while driving: differences between age groups and with and without dementia**

This research project is investigating the changes in a driver's ability to find their way to unfamiliar areas with increasing age and with the onset of dementia. The researchers are also interested in the changes in cognitive functions that may predict difficulties with wayfinding. The overall project consists of three studies: a questionnaire to find out more information about those who report difficulty with wayfinding and the strategies they use to help; a simulator study comparing wayfinding ability and driving safety when using a paper map and a passenger to help navigate; and a GPS utilisation study to determine whether senior drivers believe that navigational units are helpful when finding their way in unfamiliar areas.

#### **Karen Scally**

Faculty of Medicine, Nursing and Health Sciences, Monash University  
*Supervisors: Associate Professor Nellie Georgiou-Karistianis (Psychology), Professor Tom Triggs (MUARC) and Dr. Judith Charlton (MUARC)*

#### **Factors influencing driving performance in Parkinson's Disease**

Parkinson's disease (PD) is a movement disorder that causes physical symptoms such as resting tremor and difficulty initiating and executing movement. Research has shown that PD compromises driving ability and in particular, cognitive changes in PD are linked to poor driving performance. No effective screening methods currently exist to assess and predict driving ability

in PD. Previous research has shown that drivers with PD have significantly poorer driving performance than 'non-PD controls' and rely heavily on external cues (such as static warning signs) to regulate driving performance.

This study aims to further investigate PD drivers' responses to selected 'ecologically valid' external cueing conditions during simulated driving performance. The driving scenario for this study includes a flashing 'prepare to stop' signal used at potentially hazardous intersections where there is a high speed zone or low visibility on approach to the traffic lights.

#### **Moza Tahnoon Al Nahyan**

Faculty of Business and Economics, Monash University  
*Supervisors: Professor Amrik Sohal (Business and Economics) and Professor Brian Fildes (MUARC)*

#### **Management of transport infrastructure projects in the United Arab Emirates (UAE)**

The overall aim of this research program is to develop a framework and guidelines for the effective management of transportation infrastructure projects to ensure their success in the UAE. Three key objectives have been identified to achieve this aim: (1) identify major management issues impacting on transportation infrastructure projects in the UAE; (2) identify aspects of communication, coordination and stakeholder relations that contribute to transportation infrastructure project outcomes; and (3) develop a framework for decision-making to enhance project success.

#### **External candidates**

##### **Peta Hitchens**

University of Tasmania  
*MUARC Co-supervisor: Dr. Lesley Day*

#### **Epidemiology of falls to professional thoroughbred racing jockeys in Australia**

The aims of this study are to investigate the epidemiology of jockey falls in Australia and to identify modifiable risk factors associated with them. It is estimated that between 25 and 40 per cent of all jockeys in Australia suffer a significant injury each year and that an average of two jockeys are killed annually, yet the evidence base from which to develop preventive strategies is minimal. This PhD has three main components: establish a national jockey falls database; analyse the database to describe the epidemiology of ►

## Research Training

jockey falls and potential risk factors; and investigate the role of jockey physiology and performance characteristics in falls aetiology. Using data from the national jockey falls database, the epidemiology of flat and jumps racing in Australia has been described and published. Important contributing factors to falls by jockeys in flat and jumps racing included inexperience of the jockey, inexperienced or less accomplished horses, and competitive racing. In a pilot study, data were obtained on physiological attributes of jockeys and track-work riders. Important factors found to be associated with falls were lower aerobic and anaerobic fitness, greater muscular strength and power, and riding with the full foot in the stirrup irons compared to riding on the ball of the foot. Being a jockey carries a substantial risk of injury and death. This thesis, submitted in 2010, identified a range of factors associated with falls to thoroughbred racing jockeys riding in flat and jumps races that adds to the evidence base for formulating strategies to improve occupational health and safety standards in the thoroughbred racing industry.

### Michael Lucas

University of Western Australia  
*MUARC Co-supervisor: Dr. Lesley Day*

### Injury among Australian veterinarians

This project is a component of the Health Risk of Australian Veterinarians (HRAV) study of a cohort of veterinarians who graduated from Australian universities from 1960–2000. The aim of the HRAV study is to determine whether this cohort is at increased risk of cancer, injury, zoonoses (diseases that are transferable from animals to humans) or adverse reproductive outcomes and to determine the risk factors for these conditions in veterinary practice. The aim of this PhD study is to identify the prevalence

of, and risk factors for, injuries among Australian veterinarians and to develop a relevant prevention model for occupational settings.

### Daryl Pedlar

(Doctor of Health Science)  
Deakin University  
*MUARC Co-supervisor: Dr. Lesley Day*

### Acute farm injury in south-west Victoria

The aim of this project was to develop a framework for a preventive strategy for dairy farm injury in south-west Victoria, based on a profile of injury in this region. Theoretical models from Public Health and Clinical Medicine provide useful frameworks within which to develop prevention programs, but have not yet been used to develop a, general practitioner led, farm injury prevention strategy. This thesis applied one such model to the development of a farm injury prevention strategy for a rural region in Victoria, Australia. A suite of three projects, including two clinically based projects and a survey of dairy farmers, was undertaken to provide the local level data required to underpin the strategy. The studies produced a local profile of farm injury treated in both hospital and general practitioner settings. Examination of the validity of the hospital based injury surveillance data revealed a concerning level of data coding errors. However, the rank order of leading causes of farm injury was relatively unaffected by these errors, meaning that these data could still be used to inform priority setting. The dairy farmer survey provided complementary data on the hazard profile of local farms, the farm workforce, and farm safety attitudes and behaviours. Using a framework that integrates Haddon's injury control strategies with the PRECEDE approach for health education, a model for general practitioner

involvement in farm injury prevention was developed. Cattle-related injury, as a leading cause of farm injury in the study region, was used to test the model, resulting in the identification of a number of farm injury prevention initiatives that could be undertaken by general practitioners. Daryl graduated in late in 2009.

### Honours and Vacation Scholar programs

Every year MUARC hosts a number of undergraduate students. This allows undergraduate students to gain experience in research as well as get familiar with the injury prevention domain. It also provides an excellent opportunity for MUARC to scout postgraduate students and research assistants for the future. MUARC hosts an honours and vacation scholarship programme.

Students who are enrolled in their honours year can apply for co-supervision with MUARC and thus choose injury prevention as their topic of research for the year, and perhaps their future career.

In 2010 MUARC welcomed two honours students from the Faculty of psychology Zefi Vlahodimitrakou and Matthew Catchlove. Matthew spent his honours year on a naturalistic study of older driver distraction at intersections. Zefi worked on the development and psychometric evaluation of the Driving Observation Schedule (DOS) - a tool that measures and enables the documentation of older adult driving behaviours.

Senior students in the undergraduate programs can apply for a summer vacation scholarship. Of all applications, each year two top students are selected and offered a summer job at MUARC in order to gain research experience and decide whether a research career is something they would like to pursue.



*Daryl Pedlar's PhD looked at prevention of injuries on farms.*

MUARC also hosted two Monash University undergraduate Vacation Research Scholars during the summer months. Amy Allen, a third-year Behavioural Neuroscience student, gained significant experience working with the Human Factors team in an applied research team environment, and provided invaluable assistance organising and carrying out pilot testing for a project investigating the effects of low doses of alcohol on motorcycle rider performance and standing balance. Emma Owen, a third year Psychology student, worked with Sjaan Koppel and Lorraine Atkinson on the Ozcandrive older driver cohort study.

Amy and Emma will undoubtedly make significant contributions to the broader research community, and we are grateful for the considerable effort and expertise they demonstrated while at MUARC.

### Researcher Meetings

*Convenor: Lesley Day*

The aim of the Researcher Meetings are to provide an internal forum for the presentation of current and future projects, facilitating discussion on methodological issues, study

interpretation, and policy and practice implications. Every second meeting takes the form of a journal club. Presentations were given within the following programmatic areas:

#### Safe Systems Strategy and Infrastructure

- Bruce Corben: Progress on the intersection design project
- Peter Hillard: Severity of injury outcome for older drivers involved in intersection crashes

#### Injury Analysis and Data

- Stuart Newstead: Development of an evaluation framework for the QLD Road Safety Strategy
- Belinda Clarke and Kathy Diamantopoulou: Measuring the levels of drink-driving on Melbourne roads using roadside survey and police random breath test data

#### Injury Surveillance and Epidemiology

- Lesley Day: Reducing falls among older people in Victoria: better evidence, better targeting, better outcomes

#### Behavioural Safety Science

- Kelly Bryden: Wayfinding and the older driver- perceptions of difficulty, self-regulation and strategy use
- Sjaanie Koppel: Ozcandrive- international older driver cohort study

#### Human Factors

- Missy Rudin-Brown: Graduated licensing for motorcyclists in Victoria

#### Sports Injury Prevention

- Caroline Finch: Towards a national sports safety strategy- design of a study aimed at addressing facilitators and barriers towards safety guideline uptake
- Peta White: A behavioural approach to sports injury prevention, with application to junior cricket and netball

#### Writing Workshops

Writing workshops for PhD students and early career researchers were continued in 2010 with three sessions each focusing on a different section of a peer-reviewed paper, which the participants were preparing for submission.

# Monash University Accident Research Foundation

The Monash University Council established the Accident Research Foundation on 16 December 1996.

As stated in the Regulations, the objects of the Foundation "shall be to support encourage and promote the work of the Accident Research Centre generally, and to provide funds for research by the Centre aimed at preventing accidents and reducing injuries on the road, in the home, in sport and recreation, at work and in other places or activities ..."

The Monash University Accident Research Foundation has made scholarships available for students at MUARC for study in any of the principal research areas.

Three MUARC Scholars were supported by the Foundation during 2010.



#### John Lane Memorial Scholarship

Dr. John Lane, recognised as the father of aviation safety in Australia, and a leader in road safety, died in January 1999. In recognition of Dr Lane's contribution in the field of injury prevention, and as a personal tribute, the Trustees of the Foundation established the John Lane Memorial Scholarship. Robin Hutchinson held this scholarship in 2010 (see page 46).



#### Peter Vulcan Scholarship

Professor Peter Vulcan retired in 1998, bringing to an end 11 years of outstanding service as the champion and Founding Director of the Accident Research Centre. This award recognises his unique and distinguished contribution both to injury prevention and the Centre. Matthew Ericson held this scholarship in 2010.



#### Safe Family Research Scholarship

The Amy Gillett Foundation was established in recognition of the champion Australian cyclist who died while training in Germany in 2005. Amy's parents, Mary and Denis Safe, recognise that a growing number of cyclists are killed and injured on Australian roads each year. The Amy Gillett Foundation offers, in conjunction with the Monash University Accident Research Foundation, this scholarship to encourage research in this field. Marilyn Johnson held this scholarship in 2010 (see page 46).

# External project committee members

MUARC thanks the following people for their valuable contribution to the research program as external members on Project Advisory Committees, Project Steering Committees and Project Working Groups.

## Assessing community attitudes to speed limits

- **Colin Anderson**  
Department for Transport, Energy and Infrastructure, South Australia
- **Samantha Cockfield**  
Transport Accident Commission, Victoria (TAC)
- **Angela Conway, David Edmiston, Jonathan McGuffie**  
Department of Infrastructure, Energy & Resources, Tasmania
- **Julie Holmes**  
Department for Transport, Energy and Infrastructure, South Australia
- **Sue Hellyer**  
Office of Road Safety, Western Australia
- **James Holgate**, VicRoads
- **Damian MacDonald**  
Department of Justice, Victoria

## Australian National Crash In-Depth Study (ANCIS)

### Members:

- **Michael Case**  
Royal Automobile Club of Victoria (RACV)
- **Michael Nieuwesteeg, Samantha Cockfield**, TAC
- **Sue Freeman, David Andrews**  
Motor Accidents Authority of NSW (MAA)

- **Ross McArthur, Chris Jones**  
VicRoads
- **Dan Leavy**  
Roads and Traffic Authority NSW (RTA NSW) - Chair
- **Mark Terrell, Thomas Belcher**  
Department of Infrastructure and Transport (DIT)

### Observers:

- **Mike Hammer, Steve Cutis**  
GM- Holden
- **Bill Bridgens**  
Ford Motor Company of Australia
- **Angela Conway**  
Department of Infrastructure, Energy and Resources, Tasmania
- **Craig Newland**  
Automobile Association of Australia (AAA)
- **James Hurnall**  
Federal Chamber of Automotive Industries (FCAI)
- **Mark Morarty**  
Toyota Motor Corporation
- **Robert McDonald**  
Insurance Australia Group (IAG)
- **Robert Judd**, Autoliv

## Baseline Program Committee

- **Robert Stork**, Victoria Police
- **Antonietta Cavallo**, VicRoads
- **Samantha Cockfield**, TAC
- **Damian MacDonald**  
Department of Justice

## Baseline: Consumer choice, nonfleet vehicles

- **Michael Case, Nick Platt**, RACV
- **Samantha Cockfield, Jessica Truong**  
TAC
- **Chris Jones**, VicRoads
- **Christine Livingstone**,  
Department of Justice

## Baseline: Road design factors and their interaction with speed and speed limits

- **Bob Stork, Stuart McGregor, Robert Raaymakers**, Victoria Police
- **Antonietta Cavallo, Con Stasinis, Ken Hall**, VicRoads
- **Samantha Cockfield, Jessica Truong**  
TAC
- **Damian MacDonald, Nita Soemardjo**,  
Department of Justice

## Baseline: Strategy modelling and data systems

- **Antonietta Cavallo**, VicRoads
- **William Gibbons, Miriam Pollard**  
Department of Justice
- **Wendy Kimber, Neil Richardson**  
Victoria Police
- **Michael Nieuwesteeg**, TAC

### Baseline: Toward zero pedestrian deaths

- **Samantha Collins, Liz Knight, TAC**
- **Catherine Scott, Kenn Beer, Antonietta Cavallo, Juliet Reid**  
VicRoads
- **Kirsten Lynch, Fiona Strong,**  
Victoria Police
- **Mindy Coupe, Helen Poke, Kathy Towsty,** Department of Justice

### Baseline: Evaluation of Fixed Speed Cameras

- **Samantha Cockfield, John Thompson, TAC**
- **William Gibbons,** Department of Justice
- **Stuart McGregor, Bob Stork, Kirsten Williams,** Victoria Police
- **Antonietta Cavallo,** VicRoads

### Exercise for independent living

- **Flavia Cicuttini, Damien Jolley,** Department of Epidemiology and Preventive Medicine, Monash University
- **Leon Flicker**  
University of Western Australia
- **Keith Hill**  
National Ageing Research Institute and La Trobe University
- **Leonie Segal**  
University of South Australia

### MUARC Europe Scientific Advisory Committee

- **Loretta Baldassar**  
Monash University, Prato

- **Anne Guillaume**  
Laboratory of Biomechanics & Accidentology, (LAB), France
- **Tom Genneralli**  
Medical College of Wisconsin, US
- **Marjan Hagenzieker**  
SWOV, The Netherlands
- **Anders Lie**  
Swedish Road Administration
- **Astrid Linder,** VTI, Sweden
- **Jean Pierre Medevielle,**  
INRETS, France
- **Laurie Sparke**  
Holden Innovation, Australia
- **Pete Thomas**  
Vehicle Safety Research Centre, UK
- **Claes Tingvall**  
Swedish Road Administration
- **Alberto Tesi**  
University of Florence, Italy
- **Andre Vits**  
European Commission, Brussels

### Multi-National National Vehicle Safety Mass Data Study

- **Manuel Aviles, Anna Ferrer**  
Spanish Ministry of Transport
- **Louis Fernique**  
French Ministry in charge of Transport
- **Anders Kullgren**  
Folksam Insurance, Sweden
- **Mike Keall**  
MUARC – Subcontractor
- **Anders Lie**  
Swedish Road Administration
- **Kalle Parkkari**  
Finnish Motor Insurers Centre, VALT
- **Lucia Pennisi**  
Italian Automobile Association (ACI)
- **Claus Pastor**  
Section Passive Vehicle Safety, Biomechanics, BAST, Germany

- **Esa Raty**  
Finnish Motor Insurers Centre, VALT
- **Matteo Rizzi,** Vectura Consulting
- **Henk Stipdonk**  
SWOV, the Netherlands
- **Pete Thomas**  
Loughborough University, UK
- **Claes Tingvall**  
Swedish Road Administration
- **Martijn Vis**  
SWOV, The Netherlands

### Used Car Safety Ratings

#### Members:

- **Michael Case,** RACV – Chair
- **Samantha Cockfield, TAC**
- **Chris Jones,** VicRoads
- **Mark Borlace**  
Automobile Association, South Australia
- **John Cartwright,** DTEI, South Australia
- **Jon Gibson**  
Office of Road Safety, Western Australia
- **Alex Forrest**  
Royal Auto Club of Western Australia Ltd
- **Jack Haley**  
NRMA Motoring and Services
- **Dan Leavy**  
Roads and Traffic Authority, NSW
- **John Goldsworthy**  
Department of Transport and Infrastructure
- **Mark Terrell,** Commonwealth DoTI
- **Steve Spalding**  
Royal Automobile Club of Queensland
- **Anant Bellary**  
Transport and Main Roads, Queensland
- **Stella Stocks,** AA New Zealand
- **Stuart Worden**  
New Zealand Transport Agency

#### Observer:

- **Craig Newland**  
Australian Automobile Association

# Statement of Income and Expenditure

	\$
<b>Balance as at 1st January 2010</b>	<b>2,106,705</b>
<b>Income:</b>	<b>8,053,895</b>
DEEWR	992,042
Research:	4,593,534
Australian Research Council	329,285
National Health and Medical Research	205,519
Competitive Commonwealth Research	25,000
State Government Research	2,427,680
Commonwealth Government Research	405,990
Industry Australia Contracts	574,924
Industry Australia Grants	371,732
Industry International Research	82,986
Industry International Competitive Research	50,000
Co-operative Research Centres	120,418
Commercial	906,868
Internal Grants (Monash Research Support/Strategic Initiatives)	361,451
Other (Including Sale of Assets, Student Fees, Transfers) 1	75,000
Monash University Internal Transfer 2	1,125,000
<b>Expenditure:</b>	<b>9,047,517</b>
Salaries and Related Expenditure	5,713,152
Financial and Administration 3	452,805
Student Related	83,850
Infrastructure Related	385,141
Central Support Services – Overhead Costs	1,532,914
Other Operating Expenditure	686,912
Capital Expenditure	192,743
<b>Balance as 31st December 2010</b>	<b>1,113,083</b>

## Notes:

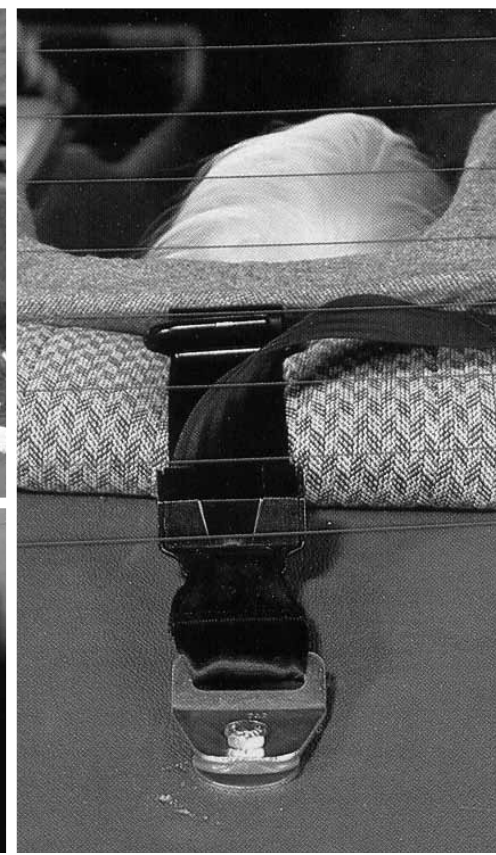
- 1 Includes funds transferred from MUARC Foundation
- 2 Accommodation and other services which were previously supplied as in-kind support have been replaced as overhead costs. The University has also provided a transfer of funds to part offset these charges.
- 3 Includes payments to consultants

The Centre's accounts have been certified correct by the University Corporate Finance Division. Where required as a condition of funding grants, accounts will be audited by the University's Internal Audit. They will be subject to Government audit as part of the University's annual accounts for the calendar year 2010.

Footnote: It should be noted that the Centre operates on a calendar financial year and its revenue and expenditure are, for the most part, project related and several projects cross fixed reporting periods and financial years. The apparent "surplus" mostly reflects grant and contract income received in 2010 for expenditure that will be incurred in 2011.

Certified Correct

JOEL CHIBERT  
Director, Research and Revenue Accounting Services  
Corporate Finance Division



# Publications

## MUARC Report Series

Charlton, J.L., Koppel, S., Odell, M., Devlin, A., Langford, J., O'Hare, M., Kopinathan, C., Andrea, D., Smith, G., Khodr, B., Edquist, J., Muir, C. & Whelan, M. (2010) *Influence of chronic illness on crash involvement of motor vehicle occupants*: 2nd edition, Monash University Accident Research Centre, Report 300

D'Elia, A. & Newstead, S. (2010) *De-identified linkage of Victorian injury data records: A feasibility study*, Monash University Accident Research Centre, Report 296

Edquist, J., Rudin-Brown, C.M. & Lenne, M. (2010) *Road design factors and their interactions with speed and speed limits*, Monash University Accident Research Centre, Report 298

Fildes, B. & Digges, K. (2010) *Occupant protection in far-side crashes*, Monash University Accident Research Centre, Report 294

Keall, M.D. & Newstead, S.V. (2010) *The effect of market group mix on crash risk in the Australasian light vehicle fleet*, Monash University Accident Research Centre, Report No. 295

Keall, M.D. & Newstead, S.V. (2010) *Characteristics of vehicles driven by different driver demographics – how can safer vehicle choices be encouraged?* Monash University Accident Research Centre, Report 301

Newstead, S., Watson, L. & Cameron, M. (2010) *Vehicle safety ratings estimated from police reported crash data: 2009 update. Australian and New Zealand crashes during 1987-2008*, Monash University Accident Research Centre, Report 297

Newstead, S., Watson, L. & Cameron, M. (2010) *Trends in crashworthiness of the New*

*Zealand vehicle fleet by year of manufacture: 1964 to 2008. Supplement to report 297*  
*Vehicle safety ratings estimated from police reported crash data: 2009 update. Australian and New Zealand crashes during 1987-2008*, Monash University Accident Research Centre, Report 297 (Supp)

Rudin-Brown, C.M., Williamson, A. & Lenne, M.G. (2010) *Can driving simulation be used to predict changes in real-world crash risk?* Monash University Accident Research Centre, Report 299

## Books and Book Chapters

Salmon, P., Stanton, N., Gibbon, A., Jenkins, D. & Walker, G. (2010) 'Human Factors Methods and Sports Science – A Practical Guide'. CRC Press

Stanton, N., Salmon, P., Jenkins, D. & Walker, G. (2010) 'Human Factors in the Design and Evaluation of Central Control Room Operations'. CRC Press

## Peer Review Journal Articles

Belin, M.A., Tillgren, P., Vedung, E., Cameron, M.H. & Tingvall, C. G., (2010) 'Speed cameras in Sweden and Victoria, Australia – a case study', *Accident Analysis & Prevention*, 42 (6), pp2165-2170

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Bugeja, L., Clapperton, A.J., Killian, J.J., Stephan K.L. & Ozanne-Smith J. (2010) 'Reliability of ICD-10 external cause of death codes in the National Coroners Information System', *Health Information Management Journal [E]*, 39 (3), pp16-26

Cameron, M.H. & Elvik, M. (2010) 'Nilsson's Power Model connecting speed and road trauma: applicability by road type and alternative models for urban roads', *Accident Analysis & Prevention* 42 (6), pp1908-1915

Cameron, M.H. & Delaney, A. (2010) 'Speed enforcement - effects, mechanisms, intensity and economic analysis of each mode of operation', *Les Cahiers Scientifiques de Transport*, 57, pp1-17

Charlton, J., Koppel, S., Kopinathan, C. & Taranto, D. (2010) 'How do children really behave in restraint systems while travelling in cars?', *Annals of Advances in Automotive Medicine*, 54, pp 181-192

Clay, F., Newstead, S.V., Watson, W.L., Ozanne-Smith, J., Guy, J. & McClure, R.J. (2010) 'Bio-psychosocial determinants of persistent pain 6 months after non-life-threatening acute orthopaedic trauma', *Journal of Pain*, 11 (5), pp420-430

Clay, F., Newstead, S.V., Watson, W.L. & McClure, R.J. (2010) 'Determinants of return to work following non-life-threatening acute orthopaedic trauma: a prospective cohort study', *Journal of Rehabilitation Medicine*, 42 (2), pp162-169

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Day, L.M., Finch, C.F., Harrison, J., Hoareau, E., Degal L. & Ullah S. (2010) 'Modelling the population-level impact of tai-chi on falls and fall-related injury among community-dwelling older people', *Injury Prevention*, 16 (5), pp321-326

Fitzharris, M.P., Day, L.M., Lord, S., Gordon, I. & Fildes, B. (2010) 'The Whitehorse NoFalls trial: effects on fall rates and injurious fall rates', *Age and Ageing*, 39, pp728-733

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Hitchens, P., Blizzard, L., Jones, G., Day, M.L. & Fell, H. (2010) 'Predictors of race-day jockey falls in flat racing in Australia', *Occupational and Environmental Medicine*, 67, pp693-698

Hosking, S.G., Liu, C. & Bayly, M. (2010) 'The visual search patterns and hazard responses of experienced and inexperienced motorcycle riders', *Accident Analysis and Prevention*, 42 (1), pp196-202

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Jenkins, D.P., Salmon, P.M., Stanton, N.A. & Walker, M.G. (2010) 'A systematic approach to accident analysis: a case study of the Stockwell shooting', *Ergonomics*, 53 (1), pp1-17

Jenkins, D.P., Salmon, P.M., Stanton, N.A., Walker, M.G. & Rafferty L. (2010) 'Using the decision-ladder to add a formative element to naturalistic decision-making research', *International Journal of Human-Computer Interaction*, 26 (2-3), pp132-146

Johnson, M., Charlton, J.L., Oxley, J. & Newstead, S.V. (2010) 'Naturalistic cycling study: identifying risk factors for on-road commuter cyclists', *Annals of Advances in Automotive Medicine*, 54, pp 267-274

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Johnston, I.R. (2010) 'Beyond "best practice" road safety thinking and systems management – a case for cultural change research', *Safety Science*, 48, pp 1175-1181

Lahausse, J.A., van Nes, N., Fildes, B.N & Keall, M. (2010) 'Attitudes towards current and lowered speed limits in Australia', *Accident Analysis and Prevention*, 42, pp 2108-2116

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McKenzie, R. & McClure, R.J. (2010) 'Sources of coding discrepancies in injury morbidity data: implications for surveillance', *International Journal of Injury Control and Safety Promotion*, 17 (1), pp 53-60

McKenzie, K., Campbell, M., Scott, D., Discoll, T., Harrison, J & McClure, R.J. (2010) 'Identifying work related injuries: comparison of methods for interrogating text fields', *BMC Medical Informatics and Decision Making*, 10 (19), pp 1-10

McKenzie, K., Harrison, J & McClure, R.J. (2010) 'Identification of alcohol involvements in injury-related hospitalisations using routine data compared to medical record review',



*Australian and New Zealand Journal of Public Health*, 34 (2), pp 146-152

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Oxley, J.A., Charlton, J.L., Scully, J.E. & Koppel, S.N. (2010) 'Older female drivers: an emerging transport safety and mobility issue in Australia', *Accident Analysis and Prevention*, 42, pp 515-522

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### Peer Review Conference Papers

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Devlin, A., Hoareau, E., Logan, D., Corben, B. & Oxley, J. (2010) 'Towards zero pedestrian trauma: literature review and serious casualty analysis', *Proceedings of the 2010 Australasian Road Safety, Research, Policing and Education*



*Conference*, 31 August – 3 September, Canberra, Australia

Fildes, B., Pennisi, L. & Rizzi, M. (2010) 'Vulnerable road user safety: Italy, Sweden and Australia', *Proceedings of the 4th International Conference Expert Symposium on Accident Research (ESAR)* 16 – 18 September, Hanover, Germany

Fildes, B., Oxley, J., Pennisi, L., Lahaussé, J., Newstead, S. & Sadullah, A. (2010) 'Vulnerable road user safety across several international regions', *Proceeding of Road Safety on Four Continents Conference (RS4C)* 2010, 28 – 30 March, Abu Dhabi, United Arab Emirates

Lenne, M. & Liu, C. (2010) 'Development of a program to train communication and teamwork skills in young drivers', *Proceedings of the 2010 Australasian Road Safety, Research, Policing and Education Conference*, 31 August – 3 September, Canberra, Australia

Mitsopoulos-Rubens, P., Trotter, M. & Lenne, M. (2010) A human-centred approach to

the design of in-vehicle information systems: a case study in usability assessment', *European Conference on Human Centred Design for Intelligent Transport Systems – Berlin 2010 Conference Proceedings*, 29 – 30 April, Berlin, Germany

Mitsopoulos-Rubens, P., Young, K. & Lenne, M. (2010) 'Utility of the lane change test in exploring the effects on driving performance in additional in-vehicle tasks while driving', *European Conference on Human Centred Design for Intelligent Transport Systems – Berlin 2010 Conference Proceedings*, 29 – 30 April, Berlin, Germany

Mulvihill, C. & Symmons, M. (2010) 'A comparison of rider attitudes and behaviours between crash-involved and non-crash involved returned motorcyclists', *Proceedings of the 2010 Australasian Road Safety, Research, Policing and Education Conference*, 31 August – 3 September, Canberra, Australia

Newstead, S. & K, Diamantopoulou, K. (2010) 'A proposed gamework for

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evaluation of road safety strategy outcomes', *Proceedings of the 2010 Australasian Road Safety, Research, Policing and Education Conference*, 31 August – 3 September, Canberra, Australia

Read, G., Lenne, M. & Moss, S. (2010) 'Associations between errors and local conditions/organisational factors in rail incidents and accidents', *Symposium Proceedings of the 9th International Psychology Association: Managing Safety – Maximising Performance*, 18 – 22 April, Sydney, Australia

Rudin-Brown, C. & Lenne, M. (2010) 'Driving simulation to support road safety policy: understanding crash risks to better inform speed setting guidelines', *Proceedings of the 2010 Australasian Road Safety Research, Policing and Education Conference*, 31 August – 3 September, Canberra, Australia

Salmon, P., Lenne, M. & Stephan, K. (2010) 'Applying systems-based methods to road traffic accident analysis: the barriers to application to an open, unregulated system', *Proceedings of the 2010 Australasian Road Safety, Research, Policing and Education Conference*, 31 August – 3 September, Canberra, Australia

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Salmon, P., Young, K., Lenne, M., Williamson, A. & Tomasevic, N. (2010) 'To err (on the road) is human? An on-road study of driver errors', *Proceedings of the 2010 Australasian Road Safety Research, Policing and Education Conference*, 31 August – 3 September, Canberra, Australia

Salmon, P., Lenne, M., Young, K., Tomasevic, N., Williamson, A. & Rudin-Brown, C. (2010) 'Driver behaviour and decision making at railway level crossings: an exploratory on-road case study', *Proceeding of the 2010 Australasian Road Safety Research, Policing and Education Conference*, 31 August – 3 September, Canberra, Australia

Young, K., Rudin-Brown, C. & Lenne, M. (2010) 'Mobile phone use and engagement in other distracting activities: an observational survey of Melbourne drivers', *Proceeding of the 2010 Australasian Road Safety Research, Policing and Education Conference*, 31 August – 3 September, Canberra, Australia

Young, K., Lenne, M., Rudin-Brown, C. & Fitzharris, M. (2010) 'How can we assess the role of driver distraction in crashes? Feasibility of using the Australian Crash In-depth Study (ANCIS) for collecting distraction data', *Proceeding of the 2010 Australasian Road Safety Research, Policing and Education Conference*, 31 August – 3 September, Canberra, Australia

## Other Conference Papers

Charlton, J., Koppel, S., Kopinathan, C. & Toronto, D. (2010) 'How do children really behave in their restraint systems while travelling in cars?', *Association for the Advancement of Automotive Medicine (AAAM)*, 18 – 20 October, Las Vegas, USA

Langford, J., Bedard, M. & Charlton, J.L. (2010) 'Can off-road screening tests assess older drivers' fitness to drive?', *Human Factors Workshop: Older Drivers 87th Annual Transportation Research Board Conference*, 10-14 January, Washington, USA

## Conferences Invited Presentations

Charlton, J. (2010) 'Naturalistic driving: a snapshot of research in Australia', *VTTI 2nd Biennial Naturalistic Driving Symposium*, 31 August - 2 September, Virginia, USA

Charlton, J.L. (2010) Invited participant in Symposium on Huntington's Disease and driving research opportunities, Cure Huntington's Disease Initiative (CHDI), 2 – 3 June, Los Angeles, USA

Mitsopoulos-Rubens, P. (2010) 'The role of human factors in led outdoor activity accidents and incidents: literature review and exploratory case study', Invited presentation, 2010 Victoria Outdoors Conference, 4 June, Melbourne, Australia

## Other Presentations to Community and Professional Groups

Charlton, J.L. (2010) *Managing older driver safety*, Presentation to Victorian Postgraduate Medical Foundation (VMPF) Seminar, Colac Hospital, 6 October

Charlton, J.L. (2010) *Senior drivers: the good news*, Presentation to University of the third age, Sherbrooke Group, 9 September

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Charlton, J.L. (2010) *Older driver cohort study: an international collaboration*, ACRS Seminar Series, March

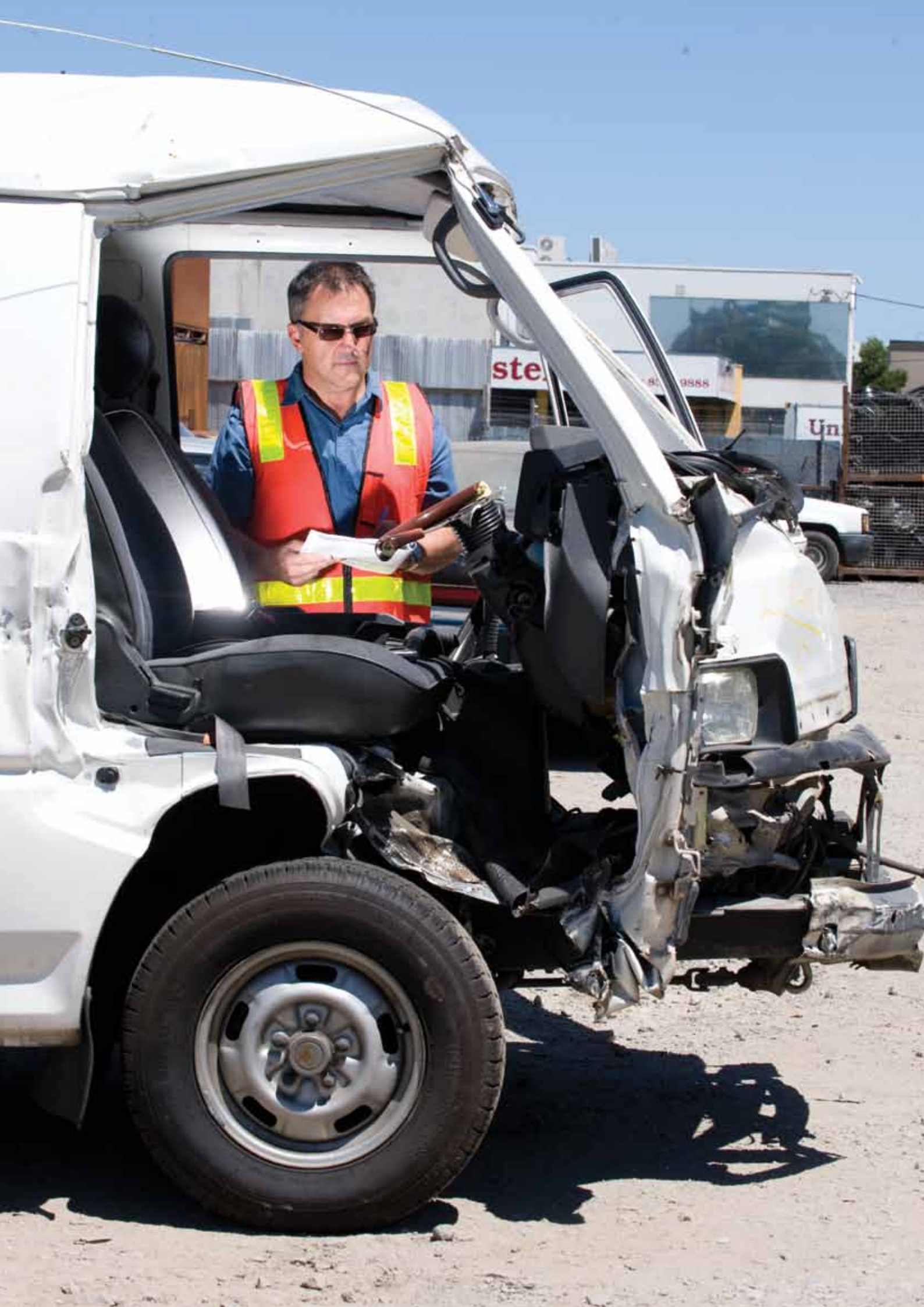
## Other Published Reports

Hughes, B.P., Hopking, S., Evans, C., McRobert, J., Mahendran, A., Newstead, S., D'Elia, A. & Jones, D. (2010) *Performance reporting of transport reform outcomes*, Report No. RR 10-002, Curtin-Monash Accident Research Centre

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Mitsopoulos-Rubens, E., Rudin-Brown, C.M., Scully, J., Newstead, S., Hodge, G. & Lenne, M.G. (2010) Graduated licensing for motorcyclists, Report to VicRoads on Contract Research Project RSD 0981

*Pictured right:  
Crash investigator Ron Laemmle inspects a  
crashed vehicle.*





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