Chair’s Foreword

In the context of a complex global financial situation, 2009 has been a challenging but important year for the future development of the Monash University Accident Research Centre (MUARC). With the support of the Office of the Senior Deputy Vice-Chancellor and Deputy Vice-Chancellor (Research), MUARC consolidated its existing relationships with government, industry and the community and broadened its partner base across a range of new areas. Throughout 2009, MUARC continued its commitment to the provision of high quality research to support our partners in reducing death and serious injury from all causes.

Substantial efforts were made to continue to establish local and regional links and increase research output from our nodes in Malaysia, Prato and South Africa. It is expected that while MUARC international nodes may take some time to develop, their potential to increase MUARC’s capacity to work with the global community to address the international burden of injury is exciting and positive.

MUARC has a strong reputation for the translation of research outcomes into policy development and practice. In 2009 the Centre initiated changes that will enhance MUARC’s focus on providing solutions to priority questions. MUARC also has a strong reputation for research excellence, and 2009 saw a dramatic escalation of MUARC’s academic productivity and peer reviewed scientific outputs. Most striking however, was MUARC’s success in combining high quality science with government- and industry-driven practical results.

Highlights in 2009 that demonstrated this integrated strength that is a feature of MUARCs identity include:

- Success with the NHMRC Partnership Grant “Evidence based targeting of state-wide strategies for preventing falls among community dwelling older people in Victoria”, that was developed in concert with the Department of Health Victoria;
- Success with an ARC Linkage Grant “Managing Older Driver Safe Mobility: an International Collaboration”, that will be conducted in collaboration with the Department of Justice, Eastern Health, Road Safety Trust, Transport Accident Commission, University of Ottawa and VicRoads;
- A lead role in Monash’s commitment with WorkSafe and TAC, to establish the Institute for Safety, Compensation and Recovery Research (ISCRR);
- An agreement between Curtin University, The Office of Road Safety (Western Australia) and MUARC to establish the Curtin Monash Accident Research Centre in Western Australia.

This has been an interesting and exciting year of growth and change. MUARC continues to evolve and build on its outstanding reputation as one of the world’s leading injury research centres. I thank the staff and the many sponsors and partners for their ongoing commitment to injury prevention.
**Contents**

Director's Report................................................................. 5  
Team Highlights:  
  Directorate.............................................................................. 6  
  Behavioural Safety Science.................................................... 9  
  Human Factors........................................................................ 14  
  Injury Analysis & Data ............................................................. 17  
  Injury Surveillance and Epidemiology ...................................... 22  
  Safe Systems Strategy & Infrastructure .................................... 25  
  Safety Science Biomechanics & Innovation.............................. 28  
  Vehicle Safety Test, Evaluation & Crash Research.................... 30  
  MUARC Europe (Prato)............................................................ 32  
  MUARC Malaysia...................................................................... 34  
  MUARC South Africa............................................................... 36  
  Monash University Accident Research Foundation.................. 38  
  Research Training..................................................................... 39  
  External project committee members....................................... 49  
  Statement of Income and Expenditure..................................... 51  
  Publications.............................................................................. 52
In a challenging year, three characteristics of MUARC research staff have ensured that in 2009 we not only responded to the challenges, but used the environment created by the global financial situation and the changing university sector to substantially enhance our partnership base and increase our research performance. Peer review publications produced by MUARC staff increased by 15% in 2009 compared to 2008, and while research income from government and industry decreased marginally this was a satisfying result considering the crisis in the automotive industry.

The key MUARC staff characteristics on which the success of 2009 depended were an unwavering belief in the importance of MUARC’s core values and activities, a belief in our ability to perform these activities with excellence, and a day-to-day focus on just getting on with the job, so that over the course of the year the collective effort resulted in a major body of work.

MUARC is known for its effective partnerships with government, community and industry. It is also known for its delivery of high quality scientific products. In 2009 MUARC demonstrated perhaps more effectively than ever, that these two capacities are two sides of the same coin. Quality science is of little use unless it has practical application, and solutions provided to priority questions posed by our partners are of little benefit unless they are based on high quality science. Major breakthroughs in solving community problems come from innovative, inspired researchers driven to achieve the highest quality product specifically focused on real world solutions. MUARC highlights for 2009 demonstrated the dual pillar of our research contribution to the local, national and global community.

The MUARC culture is a product of our staff and to a large extent, the attitude and commitment of our cohort of postgraduate students. Using a consultative process we reviewed the postgraduate program with a view to increasing the vitality and relevance of what it means to be a postgraduate scholar at MUARC and designed a comprehensive new program that will be introduced in 2010.

Critical to MUARC’s success is the way in which we work holistically so that the Centre’s outputs are overtly acknowledged as the product of both the research and administrative staff of the Centre. The excellent support provided across all levels of the Centre in areas of finance, general administration, human resources, IT, communications and publications is such that without the efforts of these core staff the Centre would have little capacity to function. In addition I would like to thank the members of the Centre Directorate and heads of the international nodes for their role in leading the Centre’s activities this year.

In 2009 MUARC staff and students have been organised within seven areas of expertise: Behavioural Safety Science; Human Factors; Injury Analysis and Data; Injury Surveillance and Epidemiology; Safe Systems Strategy & Infrastructure; Safety Science Biomechanics & Innovation; and Vehicle Safety Test, Evaluation & Crash Research. The work of these teams throughout 2009 is presented in this report. As Director of this aggregation of dedicated professionals, I offer all at MUARC, and all of the partners who have been so supportive of our work this year, heartfelt thanks. I invite you all to read through this report and gain an understanding of the range of work for which these people have been responsible.
Professor Rod McClure
Throughout 2009, Rod McClure maintained an active research program across the injury continuum. His scientific publications and presentations for 2009 reflect this activity.

Dr. Lesley Day
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 are on page 22.

Dr. Judith Charlton
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 are listed on page 9.

Professor Max Cameron
Appointed as a Professor in December 2007, Max Cameron continued part-time this role with MUARC during 2009. His important contributions include being an advisor and mentor for staff throughout the Centre and particularly in the Injury Analysis and Data Team. He also leads and undertakes a number of specific projects in relation to enforcement issues, speed and alcohol management.

Adjunct Professor Michael Regan
Adjunct Professor Michael Regan is currently on a 4-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 (a) support INRETS/MUARC involvement in EU-funded FP7 projects; (b) identify, initiate and undertake new collaborative research activities; and (c) 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”.

Professor Tom Triggs
Emeritus Professor Tom Triggs continued his association with the Centre and its Human Factors Group in 2009. 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 three PhD students at the Centre.

Dr. Eric Wrigglesworth
Dr. Eric Wrigglesworth passed away on the 23rd March 2009. The Centre is privileged to have had Dr. Wrigglesworth as an Honorary
Senior Research Fellow for many years. Eric’s broad experience over many forms of injury prevention, particularly in the areas of Level Crossings and Occupational Health and Safety were of great value to the research base of the Centre. His outstanding contribution will be greatly missed.

Presentations
Regan, M.A (2009) ‘Field Operational testing of Intelligent Speed Adaptation: Findings and Lessons Learned from the Australian TAC SafeCar project’, 2009 Intelligent Speed Adaptation Conference, Sydney, Australia, 10 November

Directorate’s Membership of Boards and Committees
- Accident Analysis & Committees
- Australian Safety Working Group, Chair/Member (I. Johnston, M. Regan)
- Commonwealth Working Party on Truck Driver shortages, Member (I. Johnston)
- Human Factors, Editorial Board (M. Regan)
- First International Conference on Driver Distraction and Inattention, Organising and Scientific Committees, Gothenburg, Sweden, 28-29 September Co-Chair (M. Regan)
- IET Intelligent Transport Systems Journal, Editorial Board (M. Regan)
- Injury Prevention Research Institutes of Australasia (I. Johnston (Member))
- International Organisation for Standardization (ISO) Technical Committee 22, Sub-Committee 13 – Ergonomics Applicable to Road Vehicles (M. Regan)
- Injury Prevention, Editorial Board (P. Vulcan)
- International Task Force on Vehicle Highway Automation, Member (M. Regan)
- International Working Group on Speed Control, Member (M. Regan)
- ISO TC 22, Sub-Committee 13 “Ergonomics as applicable to road vehicles” (Australian Representative) (M. Regan)
- Journal of the Australasian College of Road Safety, Editorial Board, Member (M. Regan)
- Journal of European Transport Research, Editorial Board, Member (M. Regan)
- Journal of European Transport Research, Editorial Board, Member (M. Regan)
- Journal of European Transport Research, Editorial Board, Member (M. Regan)
- Journal of European Transport Research, Editorial Board, Member (M. Regan)
- Journal of European Transport Research, Editorial Board, Member (M. Regan)
- Road Safety Reference Group, Victoria, Member (I. Johnston)
- Road Safety Sub-Committee, Amy Gillett Foundation (M. Cameron)
- Standards Australia Committee SF 21*: Human Factors (M. Regan)
C-MARC Curtin Monash Accident Research Centre

C-MARC 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:

- Standards Australia Committee IT23*: Traffic Information and Control Systems (M. Regan)
- Transport Industry Safety Group, Member (I. Johnston)
- Trauma systems performance improvement and registries sub-committee, Trauma committee, Royal Australasian College of Surgeons, Member (R. McClure)
- Victorian Institute of Forensic Medicine Research Advisory Group, Member (R. McClure)
- Victorian Neurotrauma Initiative Evaluation Committee, Member (R. McClure)
- Victorian Road Trauma Committee of the Royal Australasian College of Surgeons, Member (I. Johnston)
- Victorian Trauma Committee, Royal Australasian College of Surgeons, Member (R. McClure)
- 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.

Professor Ian Johnston was appointed Interim Director in 2009 and the first ten projects commenced. MUARC staff are directly involved in these research projects.

In December 2009, Associate Professor Brett Hughes was appointed Director, to take up the appointment in January 2010.
The Behavioural Safety Science Team was launched early in 2008 and assembled selected MUARC researchers into a single administrative unit with a capacity to address relevant behavioural themes. The research activity of the 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. Judith Charlton, the team’s research priorities centre on the vulnerable road user and particularly the safety of seniors, youth and children as drivers and vehicle occupants, pedestrians and cyclists. It is estimated that around 90 percent 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 which impact on their safety as road users. The team has a strong commitment to independent and evidence-based approaches to study human performance and injury prevention using a variety of research methods and technologies including driving simulation, instrumented vehicles and real-world observation, survey and interview techniques and mass data analysis.

Team 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 and technical experts at MUARC and neuroscience, medical and gerontology experts 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 skillfully 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 behaviors 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 2010.

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; and
- 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/outputs

2009 was a productive year for the team. A considerable effort was invested in grant writing throughout the year, and the fruits of these efforts began to show in November with the announcement of a successful ARC Linkage grant to study older driver issues. 2010 will mark the formal commencement of this project which will become a flagship of the team’s activities over the next five years.

Dr. Jude Charlton contributed to the Centre’s education and training as Associate Director (Education and Research Training) as well as managing the Behavioural Safety Science Team’s research activities. Jim Langford led many of the team’s projects from his primary location at C-MARC in Perth, W.A. and was a key player in preparing the successful ARC Linkage bid with Dr. Jude Charlton and Dr. Sjaanie Koppel.

Demonstration of the portable simulator at the 2009 Road Safety Conference, Sydney [Photo: Geordie McRae, Aussie Shots, Sydney]

Cyclist helmet fitted with mounted camera for data collection for Marilyn Johnson’s research [Thanks to AGF for image © Michelle Williams]
Dr. Jennie Oxley continued to contribute to research activities as a significant member of the team, including supervision of PhD students, while maintaining her primary role as Associate Director of MUARC Malaysia in Kuala Lumpur. Following a visit to Taiwan by Jude Charlton in 2008, Jennie made a return visit in December 2009 to lead a workshop on child pedestrian safety in Taipei, attended by the Taiwan government transport and education authorities, universities and other stakeholders in children’s road safety. The visit was highly successful with ongoing discussions held to explore the specific role that the team and the Centre can play in this international collaboration.

The team’s achievements included the completion of several significant projects in older driver safety, young driver training and child occupant protection. An important feature of this work is knowledge translation, achieved through scientific publications and conference presentations, including 15 peer reviewed journal papers. Team researchers also communicated their scientific findings through seminars and workshops to the motor vehicle industry and health professionals; presentations to teachers and parents; and regular communication with relevant State and Federal government departments. Older drivers, children 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 PhD scholars Hafez Alavi working in the area of pedestrian safety (with Jude Charlton and Stuart Newstead) and Lisa Molnar whose research will investigate older driver self regulation (supervised by Jude Charlton and Dr. David Eby, University of Michigan).

We also welcomed undergraduate Vacation Research Scholars Alice Barnett, a third year Monash University Science student (Summer 2008-9) and Carmel Sivaratnam (Summer 2009-2010) a third year psychology student. Alice and Carmel gained some interesting insights into the life of a scientist as they assisted in a range of research activities from manuscript writing to data analysis. Their experiences also provide an opportunity for the Centre to contribute to the development of the next generation of researchers.

Research highlights 2009:

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. To address the older (and impaired) driver ‘problem’, the team has identified three broad research questions including – “How do we identify at-risk older drivers?”, “What are the most effective solutions for managing at-risk older drivers?”, and “What is the full societal impact of reducing/stop driving on the mobility, health and economic well-being of older drivers?”. The following highlights a significant program of work addressing older driver safety:

Successful ARC Linkage Grant: Ozcandrive

In November, Melbourne researchers joined with their Canadian colleagues to celebrate the news of a successful bid to the Australian Research Council Linkage grant scheme for a $1.8 million five-year Cohort Study to investigate older driver safe mobility. A key objective of the study is to improve the safety of older drivers and to develop a process for health care professionals to determine drivers who might be at greater risk. Partners include VicRoads, Victoria Police, the Transport Accident Commission (TAC, Victoria), Road Safety Trust New Zealand and Eastern Health in Australia.

The Ozcandrive study, based at Monash University, will be conducted in collaboration with the multi-site...
Canadian study, Candrive. Together, the two projects will involve more than twelve hundred drivers and will study their health and driving patterns over a five-year period. A novel component of the project is the use of in-vehicle data recording devices to assist in documenting the natural driving life patterns of seniors.

The Ozcandrive team is very pleased to be working with Candrive. This project will build on the knowledge generated by other MUARC studies and will ultimately lead to safer roads for all Australians through the development of evidence-based screening for safe driving, innovative training and other management strategies.

Investigators, Drs Jude Charlton, Jim Langford, Sjaanie Koppel, Morris Odell and Petris Darzins from Monash University, Drs Marilyn Di Stefano and Wendy Macdonald from La Trobe University and Dr. Shawn Marshall (Ottawa Hospital), held their first project meeting in December 2009.

Older Driver simulator study

In December 2009, the team showcased findings from the older driver simulator study. This large-scale project was funded through the AutoCRC in association with Monash University and GM Holden and was the first to use the new MUARC portable driving simulator. The event was jointly hosted by MUARC and national Seniors Australia to disseminate findings to participants, sponsors and the community.

The main aim of the study was to examine the driving behaviours of older drivers in simulated driving situations which are known to present challenges for older drivers. The study involved over two hundred drivers aged 18 to over 90 years. Driving was compared across age groups: young (18-34 yrs), middle (35-64 yrs), young-old (65-74 yrs) and older-old (75+ yrs) and performance measures included braking, speed, gap selection, time headway and collisions. The results showed that drivers aged over 65 were not only less likely to exceed the speed limit but they made driving decisions based more on caution and risk-aversion compared to younger road users. The findings indicate that older drivers tend to choose less hazard-prone options in negotiating traffic, particularly when merging, such that they waited for all vehicles to clear the lane before merging. The study also revealed that seniors were slower to apply brakes compared to middle-aged and younger drivers. However, unsafe driving was found in all age groups, and there were wide individual variations. Around 30% of all drivers made risky gap selections for right turns at uncontrolled intersections.

The study provided a rich source of data on driving behaviours across a wide age range. AutoCRC Chief Executive Officer Dr. Matthew Cuthbertson said the findings were important in terms of developing effective driving and road safety interventions and crash avoidance technologies. He noted that “given the ageing population, this research provides vital intelligence for policymakers, road safety educators, car manufacturers and the general public and will help make Australia’s roads safer for all.” The study also provided important knowledge about the usefulness of a relatively low cost, re-locatable simulator and highlighted its value for studying driving behaviours and testing new vehicle technologies, road infrastructure and driver training strategies to enhance driver safety.

A naturalistic driving study of older drivers’ behaviour at intersections: ‘The 1000 Intersection Study’

This study was a collaborative effort with GM Holden funded through the AutoCRC. The study used a naturalistic driving approach with unobtrusive recording methods to study drivers’ behaviours and driving patterns in a real world setting as they drove to and from various locations over a specified time period. Ten drivers, aged 65 to 83 years participated in the study. The instrumented study vehicle was a luxury family sedan, fitted with a camera/recording system, that provided images of the driver and front seat passenger and a view of the road and traffic ahead, laterally and to the rear. Participants used the instrumented car for their everyday trips for three weeks and also drove a designated route to and from the university on two occasions. Drivers also completed a driving patterns questionnaire and were assessed on a range of functional abilities.

In total, approximately 100 hours of data were recorded across 4,493 kilometres of travel including around 1,000 left and right turn manoeuvres at intersections. Approximately 70 percent of trips were less than 10 kilometres long. Only one hard braking event - a near collision - was recorded. Detailed video analysis was conducted for driving through a specified T-intersection on the pre-defined driving route. Analysis of drivers’ gap selection at this intersection revealed that none of the participants selected a gap between oncoming cars, suggesting a very cautious approach. Most participants were driving at or close to the posted speed limit (50 km/h).

This project was a pilot study and represents a world first application of naturalistic driving methods for studying older drivers’ behaviour at intersections. The report describes the feasibility of the approach and highlights useful methodologies for collecting and analysing driving and video data to understand how older drivers negotiate intersections. The preliminary analysis has provided valuable insights into the driving performance and travel patterns of a rapidly expanding population of older drivers. The pilot study was a complex logistical undertaking which has generated a dataset and analysis techniques with arguably far greater value than the cost of the data collection. A significant outcome is that the event database can be added to with an expanded participant group, and the analysis techniques developed here can be employed in the future to address a range of important research questions about older drivers and other groups of drivers.

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 first edition of the report lead to three invited international presentations and is widely cited by Australian, US and European road safety authorities for medical review and licensing decisions. The report reviews 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 their 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. A number of 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 2nd edition report will be released in early 2010.

Children as road users

Parents as role models

Children represent an important, yet vulnerable, road user group: they are vehicle occupants, pedestrians, cyclists and users of small wheeled vehicles like scooters and skateboards, and constitute a substantial proportion of fatalities and serious injuries on Australia’s roads. Young children’s safety in traffic is of particular concern in view of their vulnerability and the special value society places on children.

Road safety education is considered an essential component of teaching children the skills to interact with traffic safely, and there is evidence that parents can play an important role as road safety role models for their children and be primary trainers in road safety skills for their children. Despite the opportunities available to parents to influence their children’s behaviour it is likely that some parents do not fully appreciate the risks their children are exposed to and how they might be able to improve their children’s safety in traffic.

This study was funded by RACV. A survey was conducted amongst parents of young children between the ages of 3 and 10 years to provide an insight into the role parents play in their children’s safety as road users. The findings of the survey provided a rich source of information on many aspects of safety of children on the road, particularly regarding parents’ overall attitudes to and knowledge of road safety, their knowledge of the important role they play in the development of their child’s road skills, and strategies they have adopted to teach road skills. Recommendations are made for the development of a resource to assist parents in their role as primary trainers of traffic skills. A final report will be released in early 2010.

Children in cars: What children are really doing in the rear seat of cars

Child restraint 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. Children squirm, slide, sleep, play and attempt to unharness themselves while travelling in their CRS, potentially leading to inappropriate seating positions throughout their journey. This behaviour may compromise the safety benefits associated with CRS.

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 a car. The study was funded through the AutoCRC in partnership with GM Holden.

Families with children aged between 1 and 8 years were recruited into the study and were asked to drive an instrumented ‘study vehicle’ on their regular trips for 3 weeks. All children used their regular CRS. The ‘study vehicle’ was fitted with a discrete camera system, providing images of the driver and front seat passenger, the rear seat child passengers and the traffic ahead. Video-recordings were analysed to examine the children’s behaviour in their CRS. Preliminary analyses revealed that children were out-of-position and hence likely to be sub-optimally restrained for around 60 percent of the time during trips. The results of this study also highlight the need to raise awareness amongst parents that sub-optimal restraint use has serious implications for their child’s CRS effectiveness in the event of a crash. The study has provided a rich data source for further analyses including the influence of children’s travel behaviour on driver distraction. The MUARC team has assembled an international team of researchers and industry partners with a view to conducting a multi-site, large-scale study in the near future.

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, Member (J. Charlton, J. Oxley)
- BrainLink (formerly Brain Foundation Victoria), Board of Directors (J. Charlton)
- Monash Ageing Research (MonRAS) (J. Charlton)
- Monash University Clayton Bicycle Strategy Steering Group, (M. Johnson)
- Monash University Human Research Ethics Committee (MUHREC), Management Committee (M. Johnson)
- Scientific Committee, VISION Congress (for Vehicle and Infrastructure Safety Improvement in Adverse Conditions and Night Driving) (J. Charlton)
Human Factors

Human 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 at MUARC 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.

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 2009 covered the following themes:

- safety at road-rail level crossings;
- the road environment and its influence on speed selection and crash risk;
- the safe system approach to collision investigation;
- driver distraction and mobile phone use;
- the design and evaluation of in-vehicle warning and information systems;
- motorcycle conspicuity and novice rider licensing systems;
- alcohol and drugs and their effects on driving;
- organisational influences on worker safety;
- occupational safety; and
- 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, cognitive interviewing, and task and usability analyses. 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 rear vision is provided by a separate projection screen at the rear of the vehicle. 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 2009 the team continued to consolidate its road safety human factors program while also expanding into further level crossings and workplace safety research. This expansion was underpinned by our systems approach to safety research and was supported by the arrival of two senior researchers to the team, Dr. Christina (Missy) Rudin-Brown from Transport Canada, and Dr. Paul Salmon from Brunel University.

Simulation and on-road testing

Level crossing research

2009 saw a significant number of team achievements and project outcomes in a broad range of human factors applications. For example, one of the first simulator studies of driver behaviour at active road-rail level crossing controls was undertaken on behalf of the Victorian Level Crossing Safety Steering Committee, the results of which were presented at the 2009 Australasian Road Safety Research, Policing and Education Conference in Sydney. Further, a review of human factors issues in level crossing safety was carried out on behalf of the

The MUARC advanced driving simulator
Human Factors

Victoria, 28 July, 2009 • Human Factors Forum, Melbourne, Victoria, 15 September, 2009 • 16th ITS World Congress, Special workshop, Transportation Research Board 88th Annual Meeting, Washington D.C., USA, January 11 • Rudin-Brown, C.M. “‘Intelligent’ in-vehicle ITS: Limiting behavioural adaptation through adaptive design”. Invited presentation at the 16th ITS World Congress, Special Interest Session 31. Stockholm, Sweden, September 22 • Salmon, P. “The role of human factors in led outdoor activity accidents and incidents”. Invited keynote presentation at the Australian Camps Association National Conference, Redland Bay, Queensland, 31 July • Salmon, P. M. “The selection, design and implementation of novel training technologies for future vehicle operator training in the ADF: review and best practice model”. Defence Science and Technology Organisation (DSTO), Defence Human Sciences Symposium, Melbourne, Victoria, 15 September • Salmon, P.M. “Driver behaviour in response to flashing red lights versus traffic lights at railway level crossings”. 8th meeting of the Rail Human Factors Forum, Melbourne Victoria, 28 July

Presentations

In 2009, Human Factors team members presented results from their research at many national and international conferences, including the 2009 Australasian Road Safety Research, Policing and Education conference (Sydney, NSW), the 16th World Congress on Intelligent Transport Systems (ITS) (Stockholm, Sweden), the First International Conference on Driver Distraction and Inattention (Gothenburg, Sweden), the 5th International Driving Symposium on Human Factors in Driver Assessment (Montana, U.S.A.), and the 88th Annual Meeting of the Transportation Research Board (TRB) (Washington DC, U.S.A.). In addition, several presentations that were not associated with peer-reviewed publications included the following.


Driver errors

In the first study of its kind, the team undertook a project to examine the nature of errors made by drivers at intersections. This study utilised a suite of innovative methods, including the ORTeV instrumented vehicle, verbal protocols and in-depth cognitive task analysis interviews, to collect accurate and objective data on the types of errors made by drivers and the frequency with which they are made. The study findings greatly enhance our understanding of the wider systemic factors that contribute to driver errors and inform potential strategies for mitigating them.

Driver distraction and technology design

In 2009, 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 a number of 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. A roadside observational survey of drivers’ use of mobile phones was also conducted during this period. The results of this research were presented at the First International Conference on Driver Distraction and Inattention in Gothenburg, Sweden and have been published as a journal paper.

The team also completed a number of projects that examined the usability and design of in-vehicle technologies and associated driver distraction. Through its involvement in the AutoCRC, the team evaluated a number of different design concepts for in-vehicle information systems (IVIS) and provided design recommendations intended to both enhance usability and manage any potential driver distractions.

Workplace safety

In the area of workplace safety, the team completed the first phase of a WorkCover NSW Research Centre of Excellence-funded research program examining police equipment and its role in injuries to police officers, with plans already underway for a second phase to investigate the positioning of equipment within police vehicles. The role of human factors in led outdoor activity incidents was investigated in a project undertaken on behalf of Victorian stakeholders in the outdoor activity domain, with results giving rise 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). It also developed a collaborative research program with VTI in Sweden examining driver errors on the road.

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).
Injury Analysis & 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.

Expertise
The IAD team has high level specialist training in numerical sciences including applied statistics and applied mathematics as well as 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 a range of physical and intellectual resources at its disposal to facilitate high quality quantitative safety research.

Expertise
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

Furthermore 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.

The use of many databases for research and evaluation purposes 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**

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, continue to be conducted by the IAD team. 2009 saw a number of major outcomes from the program:

- August saw the annual launch of the 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) the ability to protect its own occupants in a crash (crashworthiness), (2) the ability to protect other road users with which it collides (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. The ratings are made available for consumer information by road authorities and motoring clubs across Australia and New Zealand. In Victoria, they contribute a significant amount of the vehicle safety information available to consumers on the Transport Accident Commission’s howsafeisyourcar.com.au website.

- A project benchmarking trends in light vehicle safety performance in New Zealand was completed for the New Zealand Ministry of Transport. The benchmark measure developed allows the retrospective and prospective assessment of the benefits of vehicle safety policy and consumer programs in improving secondary safety of the NZ fleet and the quantification of the contribution of improved vehicle secondary safety to reducing road trauma.

- 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.

- Interpretation of the Used Car Safety Ratings vehicle secondary safety estimates in conjunction with cross sectional profiles of the distribution of vehicles in the Australian and New Zealand vehicle fleets allowed quantification of the contributions of vehicle secondary safety improvements to improvements in overall road trauma over time in Australia and New Zealand.
The research showed substantial cumulative effects of improved vehicle secondary safety over time, quantifying the benefits of programs aimed at improving vehicle secondary safety seen in all Australasian road safety strategies. Individual estimates were also obtained for each of Australia’s five largest States to provide comparison of the progress in vehicle safety performance made in each jurisdiction.

- A major project was completed examining the vehicle choices made by young drivers and how this impacts on injury outcomes in a crash. Analysis confirmed that young drivers are driving older, less crashworthy vehicles than older drivers, even when compared on an age by age basis.

Crash profile analysis indicate that young drivers are over-represented in all crash types but particularly crashes occurring at night, single-vehicle crashes, crashes occurring in rural areas and crashes occurring on wet road surfaces. Scenario modelling demonstrated that it is possible to reduce the number of serious injuries and fatalities if the vehicle choices of young drivers move towards vehicles with high crashworthiness ratings.

Whilst getting young drivers into the safest new vehicles would provide the greatest benefits, even getting them into the safest vehicles within the same price range as the vehicles they currently drive could reduce the risk of death or serious injury in a crash by around 60% on average. This research quantified the road safety benefits policy focused on improving young driver vehicle choice could potentially achieve. Results of the study were the subject of a major press release in late 2009 and received wide coverage.

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 for the investment in them. 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 2009 included a number of evaluations and development of evaluation methods.

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 framework for road safety strategy outcome evaluation for Queensland. The evaluation framework developed was based on the GOSPA framework of defining a road safety strategy formulation. The GOSPA framework defines a pyramid of increasing detail in defining the elements of a road safety strategy. The top of the pyramid defines the broad goals for which the strategy is aiming (Goals) whilst the next level down gives specific measurable targets (Objectives) against which the goals can be assessed. The Strategies area of the framework typically defines the target areas on which the road safety strategy will focus to achieve its goals along with local objectives within each target area that will jointly contribute to achieving the global objectives.

Finally the Programs and Actions areas contain the specific details on the type of activities to be carried out in each target area and the amount of effort that will be applied to each activity. The evaluation framework developed mirrored the pyramid structure defined under the GOSPA framework. 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. Each proposed tier of evaluation focuses on a specific level of disaggregation of the strategy elements corresponding to particular levels of the GOSPA framework pyramid. Successful application of the framework was demonstrated on the 1993-2003 Queensland Road Safety Strategy. It showed its potential for general application to other road safety strategies along with the potential use of the framework for forward planning of evaluation activity including resources allocation and data requirements.

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 2009 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
This project explored the feasibility of linking Police-reported motor vehicle accidents with hospital admission data for young people in Victoria. It will provide a model for similar linkages in other jurisdictions.
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 accumulated experience, the IAD team has been involved in a range of projects during 2009 offering strategic advice to a range of government authorities.

Development of strategies for speed camera enforcement in Queensland

The objective of this project was to develop strategies for:

- deployment of speed camera technology (what, where, how and how much);

- requirements of speed camera technology (number, mix and type); and

- reduction in current speeding offence detection thresholds.

Speed cameras can be operated overtly or covertly, in fixed location or mobile modes, and can focus on problem locations (black spots or routes) or aim to reduce speeds across the road network.

The options for speed camera enforcement in Queensland were defined and subjected to economic analysis to determine the benefits and costs of expanding the existing mobile speed camera hours; operating them covertly in urban areas while expanding the hours; introducing more fixed spot-speed cameras on major roads; introducing point-to-point average speed cameras on longer major road links; and installing speed/red-light cameras at signalised intersections.

The road crash reductions associated with each camera scenario were valued to estimate the social cost savings, and the costs of camera equipment, enforcement manpower (where relevant). Detected offence processing and follow-up of unpaid fines were also estimated. The economic value of each camera scenario was assessed by the benefit-cost ratio of social cost savings to total operational costs. The social value was also estimated in terms of casualty crashes expected to be saved and fatal crashes saved.

Research into aspects of a new Victoria Police traffic enforcement model

The Traffic and Transit Safety Department of the Victoria Police identified the need to develop a new traffic enforcement model to support Victoria’s new road safety strategy “arrive alive! 2008-2017” and beyond. Three objectives were proposed for the project:

1. Review national and international enforcement activities and models comparable or applicable to Victoria
2. Identify the best methods to measure the effectiveness of enforcement activities
3. In the road safety enforcement context, establish the basis and requirement for dedicated “traffic” police as opposed to general duties police only.

The three objectives of the project were addressed in three separate report parts representing the outcomes of each task. The three parts were:

- Part 1: Review of national and international enforcement activities and models
- Part 2: Best methods to measure the effectiveness of enforcement
- Part 3: Organisation of Victoria traffic policing

The first part covered enforcement activities of each type, and best practice and strategies in the areas of drink-driving and speeding where most of the evaluative research has been carried out in national and international jurisdictions.

The second part covered methods to measure the effectiveness of enforcement activities, based on principles developed in Victoria, New Zealand and recent major European reviews of traffic enforcement.

The third part outlined the necessary characteristics of Victoria traffic policing to support the “arrive alive! 2008-2017” strategy and brought out a number of issues regarding the organisation of traffic policing within Victoria Police. Within the scope of the project, these issues were addressed and recommendations made for further consideration.

Roadside alcohol survey program in Melbourne

This project, 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 at various times of the day, night and early morning hours 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, that may reflect attempts to avoid detection via the highly visible booze bus sites on arterial roads.
Economic evaluation of the introduction of lower rural default and national highway speed limits in Tasmania

The objective of this project was to explore the potential economic costs and benefits of reducing the rural speed limits on Tasmanian roads. The project included analysis of the benefits and costs for lowering:

1. the default speed limit on sealed rural roads from 100 km/h to 90 km/h, while retaining a 100 km/h limit on higher standard rural roads;
2. the default speed limit on unsealed (gravel) rural roads from 100 km/h to 80 km/h; and
3. the speed limit on lower standard National Highways from 110 km/h to 100 km/h, whilst retaining the current speed limit (110 km/h) on higher standard dual carriageway sections.

Lowering the speed limit on divided 110 km/h roads was also analysed. The economic evaluation considered the effect of the lowering of these speed limits on: travel time costs, including costs for the freight industry; vehicle operating costs; crash costs (generally based on the “human capital” method of valuing road trauma); and air pollution costs.

It was not expected that mean free speeds would drop to the same extent as the reduction in speed limit on each category of rural road. The economic analyses considered the impacts of a hypothetical 5 km/h reduction in the mean free speed of each vehicle type as being the likely maximum reduction that would result. Lower speeds in 2 km/h steps were also analysed to determine the speed which minimises the total economic impact (“optimum speed”) for each general class of vehicle. This is the speed that balances the social costs and benefits of increased travel time with decreased road trauma, vehicle operating costs, emissions and other costs.

Selection of sites for expansion of the Victorian fixed digital speed and red light camera program.

The Victorian Department of Justice commissioned the IAD team to undertake a review of the way in which intersection locations are selected for installation of new combination fixed digital speed and red light cameras. An algorithm was developed based on crash exposure at each intersection weighted by road trauma community cost data which was applied to rank each of the approximately 2500 signalised intersections across Victoria according to the potential for road trauma reductions through installation of the combination cameras. This was followed up by detailed crash pattern analysis at each site to identify optimum placement of the cameras and to validate the specific crash problems at each site.

Analysis resulted in 82 intersection legs at 78 intersections across Victoria being identified for camera installation. A media launch detailing the new sites was undertaken by the State Government that highlighted the MUARC work in selecting the sites to achieve maximum road safety benefits.

Presentations

- D’Elia, A. Development of an algorithm for driver drowsiness detection Monash Sleep Research Forum, Melbourne, 8 August
- Newstead, S. Evaluation of Legislation and Regulation, Lecture, Monash Institute of Regulatory Studies, March
- Newstead, S. The conflict between vehicle safety and the environment: insights from the Used Car Safety Ratings Australian College of Road Safety Seminar, March 19
- Newstead, S. Quantifying the benefits of safer fleet vehicle purchases, Keynote Address, RACV Fleet Business Luncheon, August 14

The Used Car Safety Rating brochures have been produced since 1992

Staff Memberships on Boards and Committees

Monash University Institute of Safety Compensation and Risk Research, Compensation Research Database Project, Project Advisory Committee (S. Newstead)
Road Safety Sub-Committee, Amy Gillett Foundation (M. Cameron)
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 focused on the ongoing and systematic collation, analysis, interpretation and dissemination of health data on injury-related incidents to support preventive action and research. A considerable amount of 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.

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 experience 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 offers a data and information service, mostly free-of-charge, open 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
Disability and falls in the ageing population
The Exercise for Independent Living study (funded by NHMRC and the Wicking Trust) reached an important milestone this year, when the final group of participants completed their 48 week exercise program and related assessments. This study addressed the issue of disability and falls among our ageing population. The aims were to: (1) test the efficacy of exercise in delaying disability and preventing falls among older people; (2) investigate the mechanisms by which exercise intervenes in the disability pathway; and (3) determine the cost-benefits of exercise for older people.

The study recruited 503 people over 70 years of age and randomly assigned them to receive one of two exercise programs: “Flex and Move” (a flexibility and relaxation program), or “Focus and Flow” (consisting primarily of Tai Chi moves) for a period of 48 weeks. Data analysis, that compared the two groups to determine if there is any difference in the development of disability as well as a range of functional outcomes such as falls, strength, balance, depression, arthritic symptoms, and life satisfaction is almost complete.
This is one of the few studies worldwide to test the impact of any exercise program on delaying the manifestation of disability among older people. Robust evidence that exercise can delay disability will have immediate and significant implications for the maintenance of independence among older people at a critical time for our ageing population. The project has the in-kind support of Australian Retirement Communities and Arthritis Victoria. Chief investigators are Dr Lesley Day MUARC, Prof Keith Hill, National Ageing Research Institute and Northern Health, Prof Leon Flicker, University of Western Australia, A/Prof Damien Jolley, Monash Institute for Health Services Research, and Prof Leonie Segal, University of South Australia.

Injury surveillance research

The Victorian Injury Surveillance Unit (VISU) produced and disseminated 193 short reports on specific topics to a range of federal and state government departments and agencies (including health, education, transport and consumer affairs), local councils, non-government bodies, industry, graduate students, researchers and the media.

We also produced two issues of the VISU publication Hazard in 2009: Edition 69 Unintentional dog bite injury in Victoria: 2005-7 and Edition 70 The impact of area socioeconomic inequity on serious injury in Victoria. More than 1500 hard copies of each issue of Hazard are distributed through our general and special mailing lists and each issue can be downloaded from the VISU web page: 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.

Recreational boating safety

The ISE team conducts a rolling program of research mainly in the area of recreational boating safety for Marine Safety Victoria (MSV), the state authority responsible for maritime safety.. The 2009 Annual Marine Report described the frequency, incidence, pattern, circumstances and potential contributory factors to marine incidents and boating-related sports and recreational injury (including fatalities) that occurred in 2008/9 (for incidents) and 2007/8 (for injuries). Over the 12-month study period there were 139 commercial, 8 fire-drive and 1,095 recreational vessel incidents recorded on the Marine Incident Database (MID), three boating-related drowning fatalities recorded on the National Coroners Information System (NCIS) and 902 hospital-treated recreational boating injury cases (223 admissions and 679 ED presentations) recorded on hospital injury surveillance datasets. These data were further analysed to investigate the activities in which high numbers of incidents and injuries occur and the contributory factors to them. Recommendations were made on possible preventive measures and future research directions.

Substantial work was completed on two other MSV projects: ‘Evaluation of the recreational boat operators licensing scheme’ and the ‘Recreational boating exposure to risk survey’. The Recreational Boat Operator Licensing Scheme was introduced in Victoria in 2001 with the objectives of improving power boat operator competencies and uptake of related safety measures. Compulsory licensing was phased in over a 12-month period from 1 February 2002. The ‘before and after’ evaluation, currently underway, measured the effect of the Licensing Scheme on the safety knowledge of a sample of recreational boat operators who were granted their licence in 2007-8. The practical skills of a subset of newly licensed Victorian recreational boat operators were also assessed. The data collection phase was completed in 2009 and the evaluation report, including recommendations on the future licensing scheme, will be presented to MSV in early 2010.

In 2009 we conducted the remaining three of four quarterly postal surveys of a random sample of 1,600 registered recreational powered boat owners conducted over the 12-month period October 1, 2008 to September 30, 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 has been analysed and a report on exposure to recreational boating activities in 2008-9 is nearing completion.

Dog bite in children

In tandem with a commissioned injury surveillance study of dog bite injury in Victoria, the Bureau of Animal Welfare (BAW) also funded the ISE team to conduct a qualitative study titled ‘Call back study of child (aged 0-9) dog bite
Over a 12-month period 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 whenever 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.

In addition, one of the team’s PhD students (Linda Watson) has chosen dog bite injury as her thesis topic and has recruited a comparison group of children from the community to convert the case series study into a case-control study which will then enable the identification of risk factors for child domestic dog bite injury. Recruitment and interviewing of controls is in progress. Study results will be presented to BAW in 2010.

**Staff Membership of Boards and Committees**

Farmsafe Australia (L. Day, W. Baker-alternate)

Farmsafe Victoria (L. Day, W. Baker)

Injury Prevention, Editorial Board (L. Day)

International Journal of Injury Control and Safety Promotion, Editorial Board (V. Routley)

Journal of Agricultural Safety and Health, Associate Editor (L. Day)

National Conference on Injury Prevention and Control Scientific Program Committee (L. Day)

Older People Injury Prevention Reference Group convened by the Victorian Department of Human Services (L. Day)

Victorian Safe Communities Network (VSCN), Executive (E. Cassell)

Kidsafe Victoria, Board (E. Cassell)

City of Melbourne Injury Prevention Committee (E Cassell)

Safestart (child injury prevention projects) Steering Committee convened by the Victorian Department of Health (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)
Safe Systems Strategy & Infrastructure

Team Leader:

Dr. Bruce Corben PhD, MEngSc(Trans), BSc
Senior Research Fellow (D)

Dr. Jeffery Archer PhD(Traffic Eng), BSc(Hons)
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Catherine Healy BA

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

Matoula Leichman
Group Administration Officer

Sara Liu BBSc; GradDip(Psych);
PostgradDip(Psych)
Research Assistant

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.

The main areas of focus for the team’s work in 2009 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.

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;
- Mechanical engineering, biomechanics and vehicle 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. A variety of study methods are typically utilised by the team such as simulation, mathematical modelling, database development, maintenance and analysis and before-after evaluations of on-road treatments.

Resources

One of the main strengths 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 continues in 2009, with work taking place at both a national level and for individual states and territories. One pleasing event in 2009 was the invitation to present this work at an international workshop on Scientific Research on Road Safety Management organised by SWOV and held in Haarlem, the Netherlands during November 2009.

A number of opportunities for collaboration with SWOV colleagues were identified in the area of safety science and management, as well as in other high priority categories of road trauma. In particular, good progress continued to be made during 2009 on one of the team’s major areas of research activity, namely, intersection safety and design.
Through collaboration with SWOV and site visits in Europe, new intersection design options have been identified, developed and quantitatively assessed, using innovative and ambitious design principles and a new mathematical tool created for the express purpose of estimating the risk of a fatality or serious injury, as a function of intersection design and operational variables.

In order to accelerate the take up of new promising designs, the team has selected several intersection designs suited to early implementation and assessment. Other team highlights include:

- Ongoing research into motorcycle safety, through the development of improved training and skills development courses for two rider groups at elevated risk, namely, newly licensed and returning riders;

- In collaboration with Caulfield Community Health Service, the team collaborated on the trial use of a star-rating tool to provide an evidence-based, objective means of assessing the safety of individual road crossing points along routes taken to or from school by children. It is hoped the tool will provide a reliable and rational basis for selecting low-risk routes for use by children or to advocate for specific safety improvements highlighted by the star-rating tool. The main purpose is to enhance safety so that children will use active forms of transport to and from school, and so address major population health concerns in Australia, such as childhood obesity and inactive lifestyles.

**Staff Membership of Boards and Committees**

- Monash University’s Roads and Traffic Sub-committee (B. Corben/N. Candappa)
- 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 Council (B. Corben)
- SRIP Advisory Group (B. Corben/N. Candappa)
- The Canadian Association of Road Safety Professionals (N. Candappa)

**Presentations**

Corben, B. (2009) ‘Drivers for Change: How can we enable children in Australia to walk or cycle safely in the streets in their own?’


Corben, B. others? (2009) ‘Safe System Strategies & Infrastructure Team research activities’ Presentation to Ministry of Transportation, Indonesia, 15 December


Team presentation to MVAF of Namibia, 20 April


Corben, B. (2009) Presentation to SEATS, 12 February


In 2009 the team, together with Honda Australia Rider Training and Learning Systems Analysis, was awarded a contract by VicRoads to develop, pilot and conduct a large-scale trial of an on-road coaching program for newly licensed motorcyclists. The four-hour coaching program was developed for Victorian riders to assist in improving rider safety and represents the first of its kind in the world. Approximately 2,400 riders will be involved in the trial in which an experienced rider coach will provide feedback to riders in groups of 2-3. The George Institute for International Health will evaluate the impact of the trial on safety outcomes over the next twelve months. The project is being funded by the Motorcycle Safety Levy.
The Safety Science, Biomechanics & Innovation (SSBI) team is a multidisciplinary team working predominantly in the areas of vehicle and road safety, crash investigation and analysis, and vehicle and traffic related occupational health and safety.

**Team leaders:**

**Dr. Peter Hillard PhD, BEng(Hons), ARSM**
Senior Research Fellow (C)

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

**Dr. Melanie Franklyn PhD, MEng (Biomedical Prelim.), BSc, CAISS**
Research Fellow

**Dr. Julie Lahausse DPsych(Org/Ind), Psych(Hons), BA**
Research Fellow

**Sujanie Peiris BSc(Hon), BE(Hon)**
Research Assistant

**Expertise**

The SSBI team have backgrounds in engineering, biomechanics, psychology/human factors and statistics. Specialist expertise of the team members include: injury biomechanics, computer modelling and simulation, crash (and other injury-causing event) investigation and reconstruction, the design of safe vehicles for application in industrial settings, evaluation of the effectiveness of new technologies using HARM and other metrics, and road and traffic engineering.

In addition to providing research and consultancy services, the SSBI team regularly provides specialist training for professionals working in related areas. In particular, the team regularly runs courses in the Biomechanics of Injury and Vehicle Crashworthiness. The team also includes a qualified Abbreviated Injury Scale (AIS) trainer who provides AIS training through the Association for the Advancement of Automotive Medicine.

**Resources**

Strengths of the team include:

- Crash investigation (light vehicles, heavy vehicles and powered two wheelers)
- Injury event investigation (particularly in industrial contexts)
- Crash reconstruction
- Design of safety systems for specialist vehicles
- Industrial traffic management plans
- Transport impact analysis reports
- Evaluation of the effectiveness of new safety technologies using HARM metrics

**Projects**

**Occupant Protection**
- HARM analysis of new in-vehicle safety technologies (LAB, France)
- Evaluation of new safety features in V8 Supercar racing vehicles (FIA/AMISS)
- Investigation of occupant protection in far-side crashes (Australian Research Council)

**In-depth Crash Investigation**
- Australian National Crash In-depth Study (ANCIS Consortium)
- Enhanced crash investigation (ECI) project – Phase II (VicRoads)

**Road Safety**
- Management of speed attitudes (AustRoads)
- Railway crossing advice (Department of Justice, Vic)

**Crash Analysis**
- TRaffic Accident Causation in Europe, TRACE (European Commission)
- Multi National Vehicle Safety Mass Data Study - To examine possibilities and likelihood of establishing a large European database for on-going benefit analyses of safety technologies (Swedish Road Administration)
- Involvement of inappropriate and excessive speed in fatal motorcycle crashes (VicRoads)

**Industrial Traffic Management**
- Review traffic volumes and flow around the Shell Geelong Refinery (Shell Refining)
- Transport impact analysis for a second heavy vehicle access to the Laverton Steel Mill (OneSteel)
Staff Membership of Boards and Committees

- Association for the Advancement of Automotive Medicine, President Elect (B. Fildes)
- European Center for Injury Prevention, Member Advisory Committee (B. Fildes)
- 6th International Conference on the Protection of Children in Cars, Scientific Programme Committee Member (B. Fildes)
- Association for the Advancement of Automotive Medicine, Scientific Programme Committee Member (M. Franklyn)
- Abbreviated Injury Scale (AIS) Teaching Faculty Member (M. Franklyn)
- Victoria State Trauma Outcome Registry Monitoring (VSTORM) Group, AIS Working Group (M. Franklyn)

Presentations

- Fildes, B. An Australasian model license reassessment procedure for identifying potentially unsafe drivers, 21st World Congress of the International Traffic Medicine Association, The Hague, 26th to 29th April 2009

This is the type of damage which confronts the team and what the research aims to prevent or minimise.
The Vehicle Safety Test, Evaluation and Crash Research (VSTECR) Team is involved in all aspects of road safety, with a focus on vehicles.

**Team Leader:**

Dr. David Logan PhD, BE(Hons)
Senior Research Fellow (C)

Sarah Barlow RN, BSc(Hons)
Research Nurse (until July)

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

Wesley Eadon
Crash Investigator

Anastasia Flocas BN, GradDipPsych, DipEd
Research Nurse (until March)

Debra Judd DipEd, BA(BAppSci)
Data entry

**Expertise**

The core specialty of the VSTECR team is the real-world crash investigation program, collecting more than 100 crashes each year across Australia for three separate studies. The resulting case databases are utilised for a wide range of research into vehicle crashworthiness, occupant injury outcomes and human factors and behavioural issues.

The team also specialises in pre-crash vehicle safety aspects, helping to design and commission advanced instrumented test vehicles and developing the research tools necessary to make use of them.

The team also has experience in evaluating and comparing emergency vehicles for the Victorian ambulance services, carrying out a comprehensive performance and safety testing research suite. The VSTECR team has a strong practical focus and provides mechanical and electrical design and fabrication services as well as advice regarding patient recruitment and ethics issues.

The team collaborates extensively with the Safe System Strategy and Infrastructure Team in the development of road safety strategies and the predictive modelling of their performance; the Behavioural Safety Science Team for pedestrian safety research and the Safety Science, Biomechanics and Innovation Team and the Human Factors Team for ambulance safety research.

The team has mechanical and electrical engineering expertise, experience in technical design and manufacturing, educational and critical care nursing and financial administration.

**Summary**

The Australian National Crash In-depth Study (ANCIS) commenced its fourth three-year contract period, having first been established in the year 2000. The ANCIS program is the core in-depth crash investigation activity at MUARC and underpins a range of other studies, including those of higher degree by research students, both locally and overseas. Since its inception, ANCIS has investigated over 800 crashes, with occupants being recruited from a large number of hospitals, principally in Victoria and NSW. The information collected by ANCIS has been used as the basis of a number of regulatory reports, as well as journal papers and conference presentations examining injury risk and the likely effectiveness of new vehicle technology. While 60 crashes per year are targeted for the next three years until the middle of 2012, ANCIS will seek to expand its collection activities, potentially through the inclusion of additional States and Territories and/or other road user groups.

Ms Huiqin ‘Cherry’ Chen, a PhD student from the College of Mechanical and Automotive Engineering at Hunan University, commenced work on a project to develop a fault-tree analysis method for establishing the contributing factors to intersection crashes. As with many student projects before it, this research relied strongly on the comprehensive ANCIS dataset.

During the year the team entered into a collaboration with the Prince of Wales Medical Research Institute (POWMRI) in NSW to assist with the collection and potential exchange of real-world crash cases between Victoria and NSW. A group from POWMRI and RTA Crashlab were trained in crash investigations by the VSTECR team.
The team continued to assist with the data collection and case presentation process for the Enhanced Crash Investigation project, providing cases and moderating several stakeholder panels during the middle of the year. Covering two wheels as well as four, the team was invited to conduct a session at the Western Australian Motorcycle and Scooter Safety Forum, “Enhanced crash investigations for motorcycles”.

Involvement in the AusDSRC industry cluster (http://ausdsrc.com.au/) continued, with the team helping to ensure that safety considerations remained high on the agenda during the cluster’s discussions. The cluster is aiming to secure the allocation of a dedicated portion of the radio spectrum in Australia for the use of intelligent transport systems (ITS) applications depending on secure, wireless broadband capability. The VSTECR team is helping to ensure that non safety-specific applications of the technology do not compromise road safety as well as facilitating the research needs of the development of safety-related applications utilising this technology, including collision avoidance through vehicle-to-vehicle and vehicle-to-infrastructure communications.

The VSTECR team worked closely with the Safe System Strategy and Infrastructure (SSSI) Team to help with the development of a mathematical model of vehicle-vehicle conflicts in intersections, providing a new way to estimate the risk of a serious injury or fatal outcome in the event of a crash between two vehicles at an intersection. The model was presented and discussed extensively with colleagues at SWOV in the Netherlands in November. A PhD student from the Department of Civil Engineering and Institute for Transport Studies, Amir Sobhani, has adopted some of the methods devised and is building his doctoral work around them.

In the road safety strategy modelling area, work was commenced on the modelling of the next Australian National Road Safety Strategy, in conjunction with the SSSI team, drawing upon and improving further upon the modelling techniques used in Victoria and WA in previous years. Western Australia continued the implementation process for their strategy, with the two teams assisting with the prioritisation of action items arising from the extensive strategy development process.

In partnership with The George Institute, work was commenced on the development of a model for the next Northern Territory road safety strategy, with the aim of tackling the significant road safety issues in that jurisdiction. A preliminary project was also conducted for Queensland Transport (now the Department of Transport and Main Roads, Queensland), to assist with the selection of KPIs for road safety in that state.

The team was also involved in presentations to the Australian Fleet Managers Association and the provision of road safety advice to the Tasmanian Legislative Council Select Committee on Road Safety.

**Presentations**

- Logan, D., Hillard, P. and Newstead, S. “Enhanced Crash Investigation and fleet vehicle safety”, AFMA meeting, St Kilda Rd, Melbourne, September [invited presentation]

**Staff Memberships**

- David Logan: AusDSRC Steering Committee: Leader Working Group 5, Safety
Research
Since its establishment in 2008, MUARC Europe has been actively forming research collaborations with institutions in Europe that have led to the development of international projects in the field of road safety. An example of a current project is a multinational database study (MUNDS) evaluating the benefits of vehicle safety technology.

Teaching and Education
In 2009 a unit on Road Trauma Prevention and Compensation was offered to undergraduate students as part of the award-winning Monash Law Prato Program which brings together 10 educational partners to provide a global learning experience. This unit, which can also be credited towards a degree other than law, addresses safety topics in road safety practices, driver behaviour, vehicle safety, road infrastructure and vulnerable road users from a research, best practice and legal perspective.

Guest lecturers included road safety experts from the Ergonomics Safety Research Institute, Loughborough University and representatives from the Australian judicial system. The course also featured a vehicle crash test conducted by mechanical engineers of the University of Florence. Students from Monash University, Université Paris XI and the University of Florence participated in the course.

Working with the Local Community
MUARC Europe is currently working with the local community in Prato and Tuscany to address road safety issues. In October 2009 it was asked to join the Prato Road Safety Observatory whose members include representatives from the local Commune, the Prefecture, the national and local police authorities, the local public health agency and the Automobile Club of Italy. The Observatory is a directive of the Ministry of the Interior and has been established in each province to examine and identify new initiatives to reduce road accidents across Italy. It is the Ministry’s response to the European Parliament initiative to reduce road accidents throughout Europe.

MUARC Europe has also formed agreements with local provincial organisations working in areas related to road safety to facilitate greater knowledge for improved road safety in the region. MUARC Europe has offered the Prato Commune research and teaching support in addressing injury prevention initiatives in the region.

At a national level, MUARC Europe has been actively collaborating with the Automobile Club of Italy to analyse national road accident data and contribute to the publication of enhanced road safety information in Italy.

MUARC Europe regularly collaborates at the European policy level, having been invited by DG TREN to participate in discussions towards setting the future road safety research agenda in Europe and conducting evaluations for the European Commission.
Collaborations and Partnerships

To help ensure MUARC Europe is focussed on critical issues in Europe, a Scientific Advisory Committee comprising prominent Australian, European and US experts has been established to help guide the direction of research undertaken by MUARC in Europe. The first meeting took place in October 2009 at the Monash Prato Centre. A key outcome has been the formation of a collaborative research network of international research and teaching organisations to address priority issues in road safety.

The business plan for MUARC Europe called for the establishment of collaborative links with a number of European and other international research and teaching organisations. To address this, MoU agreements have been formulated and signed with:

- UAEU – continuing agreement with Transport & Safety Research Centre in Al Ain, United Arab Emirates;
- UNIFI - Faculty of Engineering, University of Florence, Italy; and
- VTI – Government research organisation in Gothenburg, Sweden.

Furthermore, a number of additional MOUs are current under negotiation, namely:

- ECIP – European Centre for Injury Prevention, University of Navarra, Spain;
- CHOP – Research group at the Children's Hospital of Philadelphia; and
- LMU – Ludwig Maximilians University in Munich, Germany.

Forging partnerships in areas of common interest is about sharing expertise and knowledge that results in the development of relevant collaborative research and teaching programs for MUARC and its partners globally.

Visits and Secondments

Through the Monash University Prato Centre, MUARC Europe can arrange office space and administrative assistance to visitors who would like to use the Centre to carry out individual or collaborative research on a short or long term basis.

In 2009 MUARC Europe hosted over 20 visitors from 8 countries.
2009 has been an exciting and challenging year for MUARC Malaysia and, with the support of MUARC Melbourne and the Sunway Campus, we are continuing to develop strong partnerships and engagement with the local community. Forming these local partnerships is a fundamental step in establishing our presence in the Asian region, a key objective of MUARC Malaysia, and essential in developing effective research and initiatives to tackle safety problems. We have therefore focused many of our activities on forming these relationships with government departments, key road safety and injury prevention stakeholders, trauma hospitals, industry and academic groups in local universities and at Sunway Campus.

Research Activities
MUARC Malaysia’s key development activities in 2009 have focused around four priority areas of injury prevention. Activities and collaborative partnerships within these areas are briefly outlined below.

Road Safety
Achieving gains in road safety is a high priority. Most low to middle income countries have poor safety records and South East Asian countries are no exception, with road fatality indexes approximately five times that of high performing countries.

Through our partnerships and collaborations we are developing programs to tackle major issues in road safety. Research projects, short courses, seminars and activities address priority areas such as applying Safe System approach principles to motorcycle safety, children’s safety (as car occupants, motorcycle pillions, and pedestrians), driver/rider behaviour and education and evaluating vehicle safety technologies.

Key partner organisations include:
- Malaysian Ministry of Transport: Road Safety Department and Malaysian Institute of Road Safety (MIROS);
- Global Road Safety Partnership (Asia);
- Taiwan Institute of Transportation;
- Australian High Commission: Australia Education International and Austrade;
- Exxon-Mobil Malaysia;
- Asia Injury Prevention Foundation (Vietnam);
- Large trauma hospitals and universities (e.g., Hospital Universiti Kebangsaan Malaysia, Universiti Putra Malaysia, Hospital University of Malaya, Universiti Tunku Abdul Rahman).

Workplace Safety
Workplace safety is a significant issue in Malaysia and other SE Asian countries, with approximately 11 work-related injury cases per 1,000 workers (mostly among construction, logging, factories and commuting injuries). Our main focus here is the development of educational resources for employees, addressing slips, trips and falls in the workplace and commuting injuries.

Key partner organisations include:
- Occupational Health and Safety, Sunway Campus;
Key partner organisations include:

- Ministry of Human Resources: Social Security Organisation, Department of Occupational Safety and Health, and National Institute of Occupational Safety & Health; and
- Federation of Malaysian Manufacturers.

Health Education and Promotion

The overall health of Malaysians, particularly vulnerable groups such as children, adolescents and the elderly is another area of developing research. MUARC Malaysia is working with a number of organisations and research teams to examine various aspects of health outcomes and promotion of healthy lifestyles. In particular, research programs are developing to address sedentary behaviour amongst adolescents, provision of healthy environments for young school children, injury prevention and health outcomes of physical inactivity amongst older populations. The outcomes of these planned research programs will provide a good understanding of health measures and guide the development of education/ training programs and initiatives aimed at improving overall health, well-being and functional outcomes of sub-populations.

Key partner organisations include:

- National Sports Institute: Sport, Health and Activity Research Malaysia,
- Universiti Sains Malaysia
- Universiti Putra Malaysia
- Monash University Sunway Campus (Schools of Medicine, Engineering and IT)

Child Injuries

This is a multi-faceted area of our research and encompasses both intentional and unintentional injuries to children in Malaysia. Throughout 2009 we have initiated and developed collaborative teams with groups from government departments, international NGOs, trauma hospitals and other stakeholders to develop research programs and related activities addressing child injuries in Malaysia. In particular, research programs are being developed to better understand the underlying causes of intentional child injuries, to run workshops and seminars, and to trial interventions at all levels of government, community and family groups to reduce child injuries.

Key partner organisations include:

- Ministry of Health: Institute of Health Management
- UNICEF
- Department of Pediatrics, Hospital Universiti Kebangsaan Malaysia
- Department of Pediatrics, University of Malaya,
- Child Abuse and Protection Research Australia, Monash University

Teaching and Education

Another major focus of MUARC Malaysia’s activities in 2009 has been to build our research capacity. A number of activities have been undertaken to achieve this including contributions to short courses, minor undergraduate research projects, presentations to various organisations including MIROS, UTAR, Sunway Campus.

In addition, we have encouraged and promoted MUARC’s doctoral research program and are supporting a number of applications to undertake PhD research programs. A highlight of 2009 was to welcome our first Malaysian-based PhD student to MUARC, Dr Roszalina Ramli. Roszalina commenced her Doctorate in April 2009, and throughout the year has developed her study design with much enthusiasm and dedication. Roszalina’s research addresses a high priority road safety area in Malaysia, that of motorcycle injuries, particularly the effect of helmet design and wearing rates on cranio-maxillofacial injuries. This is a prospective case-series study of injured motorcyclists presenting to hospitals. A range of research tools – questionnaire, medical records, helmet inspection and analysis, crash investigations, and use of CCTV footage of crashes – will be used to understand crash circumstances, rider and helmet-related factors in determining the pattern and severity of cranio-maxillofacial injuries.

We have a number of other interested PhD candidates addressing a range of injury prevention research programs in the region such as evaluation of new vehicle technologies, examination of pedestrian trauma in Bangladesh, predictors of health and injury outcomes of disadvantaged populations, and look forward to attracting and welcoming more students to the MUARC Malaysia team in 2010.

The Way Forward

MUARC Malaysia has established itself as a collaborative injury prevention research unit in Malaysia and this will continue in the future. The goal for MUARC Malaysia in 2010 and beyond is to consolidate the progress we have made in 2009. Further strengthening of long-term research partnerships with local organisations, as well as translating these collaborations into large-scale research programs are major priorities. It is anticipated that, within the next 12 months, MUARC Malaysia will have established itself as a Centre conducting high quality research projects addressing high priority health areas within the Asian and South East Asian regions.
MUARC established a presence in South Africa in mid-2008 as the Injury Prevention and Safety Promotion (IPSP) Research Node, under the leadership of Dr Michael Fitzharris. The Node sits within the Office of the Deputy Pro-Vice Chancellor: Research, on the Monash South Africa campus at Ruimsig (Johannesburg).

The Mission Statement of the IPSP directly reflects the Mission Statement of MUARC, that being:

To conduct high quality public health injury prevention programs relevant to the challenges faced by contemporary Africa, and in so doing, engage and challenge government, industry and citizens to act collectively to eliminate serious health losses due to injury.

With the support of MUARC, the research node will conduct health and injury prevention programs aligned with the Millennium Development Goals. Capacity building to advance the health of all African citizens is a core goal.

Activities
The year 2009 represented the first full year of operation of the Node. Activities were focused on developing core relationships with identified partners, building recognition of the activities of the Node and Monash South Africa, and consolidating a physical presence on the Monash South Africa campus.

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 campus. The work program is exclusively on road safety in Africa.

Program in South Africa
A collaborative approach to the work program was a fundamental development goal. MUARC-SA was privileged to enter a Memorandum of Understanding (MoU) on the conduct of research with the South African Medical Research Council and the MRC-University of South Africa Lead Program on Crime, Violence and Injury. The MoU was signed by Professor Anthony Mbewu, President of the MRC, Professor Barney Pityana, Principal and Vice-Chancellor of UNISA and Professor Richard Larkins, Vice Chancellor of Monash University. This MoU formalised the research partnership in the areas of health promotion and injury prevention, particularly child health and road safety. Activities also included the establishment of partnership research relationships with the Global Road Safety Partnership of South Africa (GRSP-SA) and engagement with the Road Traffic Management Commission (RTMC) of South Africa.

Program in Tanzania
Following the signing of the MoU with the Ministry of Home Affairs, the development of the research program was the core focus. In addition, relationships were established with the Ministry of Infrastructure Development. The goal of both partnerships was to work collaboratively to reduce the burden of road crashes and, more broadly, injury prevention across Tanzania.

Program in Botswana
Under the auspices of an established teaching and research agreement with the University of Botswana in Gaborone, the capital of Botswana, a longitudinal study examining the association between road laws and regulations and road traffic crashes was developed. This project was established in conjunction with the
recently established University of Botswana Trauma Working Group led by Dr Andrew Kestler and the Botswana Police Service.

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**

Under the auspices of a MoU between the Motor Vehicle Accident (MVA) Fund of Namibia and Monash University signed by the CEO of the MVA Fund Mr Jerry Muadinohamba and Professor Simon Adams, Pro Vice-Chancellor (International Engagement), Monash University, MUARC-SA was awarded a grant by the MVA Fund to conduct a pilot injury surveillance study in four hospitals in Windhoek, the capital of Namibia. This study involved the School of Psychology at Monash South Africa through the involvement of Ms Maatje Scheepers. The purpose of the study is to examine the burden of injury in Namibia and to determine the feasibility of establishing a linked dataset that captures pre-hospital information, hospital information, police information and claims data for those involved in road crashes.

**Collaborations within Monash University**

In addition to the engagement noted above, an international MUARC workshop was held in October 2010. Professor Brian Fildes hosted the workshop at MUARC-Europe, at the Monash University Prato Centre.

The purpose of the workshop was to examine ways to capitalise on MUARC’s international network with discussions involving Professor Rod McClure, Director of MUARC, Dr Jennie Oxley, Associate Director MUARC-Malaysia and Professor Claes Tingvall.

**Public Engagements**

Dr Fitzharris was invited to participate in the Make Roads Safe “Decade of Action” Summit panel held in July in Dar es Salaam, The United Republic of Tanzania. The Decade of Action is sponsored by the FIA Foundation, the World Bank Road Safety Facility and the World Health Organization. In the days following the Summit, the United Nations Economic Commission for Africa (UNECA) held a road safety workshop, which served to advance the road safety agenda in Africa.

Michael Fitzharris was invited by Professor Doug Brown, Chair of the Prevention Committee, to present at the Prevention Symposium of the International Spinal Cord Society (ISCoS) Annual Meeting held in Florence, Italy in October. The presentation was titled “Overview of Prevention of SCI due to Road Traffic Crashes”. At the same meeting, Michael was elected Chair of the Road Crash Prevention Sub-Committee of ISCoS.

**The way forward**

The goals for 2010 and beyond are to consolidate established relationships to advance road safety knowledge throughout the sub-Saharan region. To this end, the enrolment of higher degree students, the development of short course and graduate programs and the expansion in the number of core staff on the Monash South Africa campus remain the priority focus areas.
The Accident Research Foundation was established by the Monash University Council 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 the Accident Research Centre for study in any of the principal research areas of the Centre. Three MUARC Scholars were supported by the Foundation during 2008.

John Lane Memorial Scholarship
Dr. John Lane, recognised as the father of aviation safety in Australia, and a leader in road safety, died on January 21, 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 was holder of this scholarship in 2009.

Support has been provided for a postdoctoral scholar.

Peter Vulcan Scholarship
Professor Peter Vulcan retired in 1998, bringing to an end eleven years of outstanding service as the champion and Founding Director of the Accident Research Centre. His unique and distinguished contribution both to injury prevention and the Centre were recognised with the establishment of this award.

Matthew Ericson was holder of this scholarship in 2009.

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, as more people turn to bicycles for health and transport. The Amy Gillett Foundation has offered, in conjunction with the Monash University Accident Research Foundation, the Safe Family Research Scholarship – to encourage research in this important field of road safety.

Marilyn Johnson was holder of this scholarship in 2009.

(For project descriptions see the Research Training section following.)

Postdoctoral Scholar, Diana Samarakkody
Dr. Diana Samarakkody from Ministry of Health Sri Lanka, joined the Centre in 2008 as a postdoctoral scholar for two years. Throughout 2009 Diana was principally involved with writing a practitioners guide to injury prevention aimed at grass root practitioners in low income countries. Diana has also completed the Mental Health First Aid training programme and is following the Monash University Research Supervision Accreditation Programme. Diana has also been involved in developing the research project ‘Environments for Healthy Living: Monash Study of Population Health’ that focuses on identifying contributory factors of child injury.
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.

Program Highlights:

2009 marked the first intake of MUARC postgraduate students at the Sunway campus. MUARC Malaysia candidate, Roszalina Ramli will study motorcycle injuries in Malaysia. In total, five new candidates joined the Centre’s HDR program during 2009, making a total of 22 PhD students enrolled through MUARC.

New candidate, Hafez Alavi, was awarded an Australian Postgraduate Award (APA) to study risk factors for pedestrian crashes in Melbourne. Part-time candidate, Michael Bourne, will evaluate local injury prevention and safety promotion programs. External student, Lisa Molnar based in Ann Arbor, Michigan, USA is undertaking a study on older driver self-regulation. Staff candidate, Kristie Young, a Research Fellow in the Human Factors team, commenced studies in July, and will compile her thesis based on a series of publications on the effects of in-vehicle Intelligent Transport Systems on driver behaviour and acceptability.

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. A number of students attended national and international meetings in 2009:

MUARC was well-represented by students at the 9th National Injury Prevention & Safety Promotion Conference in July, Melbourne. Jessica Killian presented a paper on ‘Drugs detected in unnatural deaths in Victoria’. Lyndal Bugeja also presented an award-winning paper on ‘Research to practice: public policy versus public health’ and Marilyn Johnson presented a paper on ‘Cyclist behaviour and safety: A video observational study of Melbourne commuter cyclists’.

Marilyn Johnson, who holds an Amy Gillett Foundation scholarship, also attended the Australasian Road Safety Research, Policing and Education Conference Workshop on Cycling Safety in November, Sydney, where she presented an overview of her PhD research. With support from a MRGS Travel Grant, Marilyn travelled to Brussels in May, where she presented at the Velo-City cycling conference 2009: recycling cities. Her paper was entitled ‘Staying in the lines: a comparison of driver interaction with cycling infrastructure at two different intersections’. Whilst in Europe, Marilyn took advantage of the opportunity to visit world leaders in cycling safety at SWOV in the Netherlands and met with simulator experts at INRETS, France, strengthening links with two partner institutions with which MUARC holds MoUs. She returned to MUARC via MUARC Malaysia at Monash Sunway campus and presented her PhD research to the Malaysian Institute of Road Safety (MIROS).

Karen Stephan, recipient of a NRMA-ACT Trust scholarship, presented at the Trust’s postgraduate showcase event in September, at the National Museum of Australia in Canberra. Karen presented on ‘Speed limits and road environment: moving towards a uniform low crash risk’. The two-day event included a visit to Government House for morning tea with the Governor General Her Excellency Ms Quentin Bryce.

Eve Mitsopoulos-Rubens travelled to Big Sky, Montana, USA in June to attend and present at the 5th International Symposium on Human Factors in Driver Assessment, Training and Vehicle Design. Her paper was entitled ‘Comparing the gap acceptance and turn time patterns of novice with experienced drivers for turns across traffic’.
Fiona Clay was invited to speak to the Transport Accident Commission in December on aspects of her PhD research on ‘Predictors of return to work and work disability following injury’.

External candidate, Lisa Molnar, attended the Gerontological Society of America Conference (GSA) in Atlanta Georgia USA in November, where she presented two papers related to her older driver research.

Linda Watson attended the Australian Institute of Animal Management Annual Conference on Urban Animal Management held at Geelong in October, 2009. This provided an excellent opportunity for networking in Linda’s research field in injury prevention: dog related injuries.

**Community participation and external recognition**

Whilst their research of itself is very rewarding, it is also very pleasing when students’ skills are recognised by the community and by external academic and professional groups. We acknowledge two such achievements:

- Fiona Clay is the student representative on Australasian Epidemiological Association (AEA) National Council and assisted in the organisation of an Early Career Workshop AEA conference Dunedin, New Zealand.

**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**

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.

Five journal articles were prepared and submitted for publication.

During 2009, the work was presented at the 9th National Conference on Injury Prevention and Safety Promotion; Trauma Melbourne; the Transport Accident Commission; and the Australasian Epidemiological Association annual conference in Dunedin, New Zealand. (NHMRC scholarship)

Clay Douglas
Supervisors: Professor Brian Fildes, Dr. Tom Gibson (Human Impact Engineering) and Dr. Peter Hillard

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.

As a result, 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. Therefore, 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 USA as well as industry partners GM Holden and Autoliv. (Australian Postgraduate Award (Industry))

Matthew Ericson
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 which 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. Matthew expects to submit the thesis in 2010. (Monash University Accident Research Foundation Peter Vulcan Scholarship)

Richard Fernandez
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 thigh bone. 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.
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**

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

**Supporting lane change behavior 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 way 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**

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...
of real-life, naturalistic driving, as part of four experiments, three of which will commence in late 2010. Phase 1, a questionnaire instrument served to provide a theoretical and contingent on the nature of the task at hand. The outcomes of this research will 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  
Supervisors: Emeritus Professor Tom Triggs and Dr. Mike Riegan  
**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 which necessitates appropriate modification to one's driving behaviour to ensure that safety is not compromised. Pre-requisites 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 thesis will be submitted in 2010.

**Lisa J. Molnar**  
Supervisors: Dr. Jude Charlton and Dr. David W. Eby  
**Self-Regulatory Practices by Older Adults**

Self-regulation of driving (i.e., 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 in part to differences in how self-regulation is measured, characteristics of study subjects, and inclusion of measures thought to influence self-regulation.

The aim of this research is 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
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 Heath.

Carlyn Muir
Supervisors: Dr. Judith Chartlton, Professor Brian Fides 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 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
Supervisors: Professor Rod McClure, Dr. Jennifer Oxley, Dr. Peter Hillard, Professor Ahmad Farhan Sadullah (MIROS)

Effectiveness of motorcycle helmet for preventing cranio-maxillofacial injuries

Malaysia is a rapidly developing country in the South-East Asia region. As part of this development 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 ten 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 cranio-maxillofacial 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.

Virginia Routley
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 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 2,200 occupant interviews, 10 focus groups and media reviews were conducted. The PhD is a thesis by publication and to date five journal articles have been published and two submitted. As at December 2009 the thesis was very close to submission.

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 significantly each year. An absence of child restraint belts and belt tampering, a practice of 12-15% of taxi drivers, was observed. Seatbelts were reported by interviewed drivers as 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”. The focus group results and comparison with Victoria, incorporating media reviews have been submitted to journals for review.

In conclusion seat belt wearing has declined since legislation in urban areas. There is a need to promote awareness that injury can occur at relatively low speeds and to enforce correct wearing for taxi drivers. Wearing habits should be developed by consistent, visible and sustained enforcement.

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.

Publications and conference presentations in 2009

Routley, V, Ozanne-Smith, J, Li, D, Yu, M, Wang, J, Zhang, J, Zendong, T, Wu, M, Wang, P, Qin, Y, Attitudes to seat belt wearing and related safety features in two cities in China, International
Karen Stephan
Supervisors: Dr Stuart Newstead, Dr Michael Lenné
Crash risk and driver behaviour in complex urban settings: effect of road design and surrounding environment
Karen's research is designed to investigate the effect of the design of the road and the roadside 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 roadside environment that impact on the risk of a crash occurring. Once these factors are identified, potential countermeasures will be developed. The second component of the research will involve conducting experiments in the MUARC advanced driving simulator to evaluate the countermeasures in terms of how they change driver behaviour and potentially modify the risk of a crash occurring. 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 develop recommendations for the design of strip shopping environments so as to reduce crash risk. It is expected that the outcomes of this research will 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 evaluation of countermeasures developed as a result of these models, which can be applied to any road environment. NRMA- ACT Road Safety Trust postgraduate scholarship

Trang Vu
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
Due to major feasibility concerns about the Vietnam project, potential alternative research topics on falls prevention in community-living older people were explored early in 2009. This exploration phase resulted in the commencement of a new thesis research topic in March 2009 based on some components of an NHMRC Partnership Grant Application entitled “Reducing falls among older people in Victoria” (which was subsequently funded). The thesis research examines the effects of comorbidity on hospital resource use by community-dwelling older people hospitalised due to falls using the Victorian Admitted Episodes Dataset for fiscal years 2006–08, 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
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 disproportionally 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...
Staff Candidates:

Jim Langford  
_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;
- 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  
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.

2009 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 stimulator 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 Chariton (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 driving ability is compromised by PD 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 (e.g., static warning signs) to regulate driving performance.

This study aims to further investigate PD drivers’ responses to selected ‘ecologically valid’ external cuing 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 25–40 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 jockey falls and potential risk factors; and investigate the role of jockey physiology and performance characteristics in falls aetiology.

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 is 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 and input from a regional consultative forum. The dairy farm injury profile will be developed from specialized emergency department and general practice injury data collections, in addition to an exposure survey of dairy farmers.

Vacation placement
Carmel Sivaratnam
I found my vacation placement at MUARC very rewarding on a number of levels. I worked in the Behavioural Safety Science Team with Judith Charlton and Michelle Whelan on a child observation study exploring the types of activities child passengers engaged in while travelling in cars, and particularly what activities are associated with being out of position or sub-optimally restrained (outside the protective boundary of their Child Restraint Systems). I helped to develop a set of behavioural categories and then applied these to the data-coding of video tapes of child participants’ activities during car trips.

My placement at MUARC also involved conducting a literature search on types of play, as well as previous behavioural observation studies involving children. I have also contributed to writing the introduction and method sections of a manuscript for a scientific research journal paper on this project.

Through these tasks, I gained many hands-on skills and insights into the processes involved in research, which I am confident will be invaluable as I undertake my honours year in Psychology this year. Being involved in a research project such as this has
opened my eyes to the importance of integrating disciplines such as behavioural science and road safety technology in order to minimise crash risk, which is currently a major cause of accidents and injury in children in Australia.

**Academic seminar programs**

**Lunchtime seminar series**

Convener: Julie Lahausse

Seminars are presented throughout the year on a range of injury prevention topics. The seminars are open to other faculties and the wider community. Details of upcoming seminars are available on the Centre’s website. The Centre would like to thank those who made presentations during 2009.

Nicole van Nes, SWOV
The Dutch National Road Safety Strategy: Advanced Sustainable Safety - the strategy that might be the secret that makes the Netherlands the world’s top performer in road safety

Professor Gordon Smith, Epidemiology and Preventive Medicine, University of Maryland
Motor vehicle, alcohol and occupational injuries: Research activities at Maryland

David Healy, Senior Manager, Road Safety, Transport Accident Commission (TAC)
Research into action - the challenges and the successes. How research has helped to shape TAC’s strategic objectives and what the main road safety priorities are for the future

Dr Michael Regan, MUARC (currently on secondment to INRETS)
An overview of current and recent activities in France

Professor Peter Cameron, Head of the Prehospital, Emergency and Trauma group, Department of Epidemiology & Preventive Medicine, Monash University

**Researcher Meetings**

Convener: Lesley Day

The successful Researcher Meetings were continued in 2009, with every second meeting taking the format of a journal club. The aim of the 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. Presentations were given within the following programmatic areas:

**Surveillance, Data Systems and Measuring Burden**

- Erin Cassell: Overview of VISAR databases and research potential
- David Logan: Overview of ANCIS database and research potential

**Simulation and design**

- Amy Williamson: Teaching communication skills to adolescent drivers and passengers: influences on behaviour in a driving simulator
- Maggie Trotter: Usability testing of three in-car entertainment systems

**Program implementation and evaluation science**

- Lesley Day: Preliminary results of the Exercise for Independent Living study
- Lesley Day: Evaluation of Worksafe Victoria’s Employer Performance Management Program

**Feedback from the 9th National Conference on Injury Prevention and Safety Promotion**

- Staff, students and visitors who attended this conference will give snapshots of the best new research presented from around the country (and in some cases overseas).

**Surveillance, Data Systems and Measuring Burden**

- Angelo D’Elia: Probabilistic linkage of Victorian injury data records
- Fiona Clay: Understanding the burden of injury for minor and moderate acute orthopaedic trauma
MUARC would like to thank 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, SA

**Samantha Cockfield**  
Transport Accident Commission

**Angela Conway**  
Department of Infrastructure, Energy & Resources, TAS

**David Edmiston**  
Department of Infrastructure, Energy & Resources, TAS

**David Healy**  
Transport Accident Commission

**Julie Holmes**  
Office of Road Safety, WA

**Sue Hellyer**  
VicRoads

**James Holgate**  
VicRoads

**Damian MacDonald**  
Department of Justice

**Jonathan McGuffie**  
Department of Infrastructure, Energy & Resources, TAS

**Nicole van Nes**  
SWOV Institute for Road Safety, the Netherlands (on secondment)

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

**Thomas Belcher**  
Department of Infrastructure, Transport, Regional Development and Local Government

**Bill Bridgens**  
Ford Motor Company of Australia

**Michael Case**  
Royal Automobile Club of Victoria (RACV) Ltd

**Angela Conway**  
Department of Infrastructure, Energy & Resources (Tasmania)

**Samantha Cockfield**  
Transport Accident Commission

**Paul Fay**  
Ford Europe

**Jack Haley**  
National Roads and Motorists’ Association Limited

**Mike Hammer**  
Federal Chamber of Automotive Industries

**Chris Jones**  
VicRoads

**Robert Judd**  
Avtoliv Australia

**Dan Leavy**  
Roads & Traffic Authority (NSW)

**Robert Macdonald**  
Insurance Australia Group

**Mark Morarty**  
Toyota Motor Corporation of Australia

**Craig Newland**  
Australian Automobile Association

**Ashley Sanders**  
Mitsubishi Motors Australia Ltd

**Dimitra Vlahomitros**  
Motor Accidents Authority (NSW)

### Baseline: Consumer choice, non-fleet vehicles

**Michael Case**  
Royal Automobile Club of Victoria (RACV) Ltd

**Samantha Cockfield**  
Transport Accident Commission

**Nick Platt**  
Royal Automobile Club of Victoria (RACV) Ltd

**Jessica Truong**  
Transport Accident Commission

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

**Kevin Casey**  
VicPol

**Antonietta Cavallo**  
VicRoads

**Samantha Cockfield**  
Transport Accident Commission

**Ken Hall**  
VicRoads

**Damian MacDonald**  
Department of Justice

**Con Stasinos**  
VicRoads

**Jessica Truong**  
Transport Accident Commission

### Baseline: Strategy modelling and data systems

**Antonietta Cavallo**  
VicRoads

**William Gibbons**  
Department of Justice

**David Healy**  
Transport Accident Commission

**Wendy Kimber**  
VicPol

**Michael Nieuwesteeg**  
Transport Accident Commission

**Neil Richardson**  
VicPol

### Baseline: Toward zero pedestrian deaths

**Samantha Collins**  
Transport Accident Commission

**James Holgate**  
VicRoads

**Linda Ivey**  
VicRoads

**Liz Knight**  
Transport Accident Commission

**Kirsten Lynch**  
VicPol

**Cassady Southern**  
Department of Justice
Exercise for independent living

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

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

Farm Injury Risk among Men (FIRM)
Jim Dosman  University of Saskatchewan, Canada
Louise Hagel  University of Saskatchewan, Canada
John Langley  Injury Prevention Research Unit, University of Otago, New Zealand
Malcolm Sim  Department of Epidemiology and Preventive Medicine, Monash University
Don Voaklander  University of Alberta, Canada
Rory Wolfe  Department of Epidemiology and Preventive Medicine, Monash University

Jim Dosman University of Saskatchewan, Canada
Louise Hagel University of Saskatchewan, Canada
John Langley Injury Prevention Research Unit, University of Otago, New Zealand
Malcolm Sim Department of Epidemiology and Preventive Medicine, Monash University
Don Voaklander University of Alberta, Canada
Rory Wolfe Department of Epidemiology and Preventive Medicine, Monash University


Jill Green  SIDS and KIDS Victoria
Ros Howe  Consumer Affairs Victoria
Sarah Proudfoot  Australian Competition and Consumer Commission
Beverley Steer  Department of Health and Ageing
Tim Wain  Infant and Nursery Product Association of Australia
Megan Urlich  City of Greater Geelong, SafeStart Project

Jill Green SIDS and KIDS Victoria
Ros Howe Consumer Affairs Victoria
Sarah Proudfoot Australian Competition and Consumer Commission
Beverley Steer Department of Health and Ageing
Tim Wain Infant and Nursery Product Association of Australia
Megan Urlich City of Greater Geelong, SafeStart Project

MUARC Europe Scientific Advisory Committee
Loretta Baldassar  Monash University
Anne Guillaume  Laboratory of Biomechanics & Accidentology, (LAB) France
Tom Genneralli  Medical College of Wisconsin, USA
Marjan Hagenzieker  SWOV, the Netherlands
Anders Lie  Swedish Road Administration
Astrid Linder  INRETS, France
Jean Pierre Medevielle  INRETS, France
Laurie Sparke  Holdens 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

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Anne Guillaume Laboratory of Biomechanics & Accidentology, (LAB) France
Tom Genneralli Medical College of Wisconsin, USA
Marjan Hagenzieker SWOV, the Netherlands
Anders Lie Swedish Road Administration
Astrid Linder INRETS, France
Jean Pierre Medevielle INRETS, France
Laurie Sparke Holdens 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  Spanish Ministry of Transport
Louis Fernique  French Ministry in charge of Transport
Anna Ferrer  Spanish Ministry of Transport
Anders Kuligren  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

Manuel Aviles Spanish Ministry of Transport
Louis Fernique French Ministry in charge of Transport
Anna Ferrer Spanish Ministry of Transport
Anders Kuligren Folksam Insurance, Sweden
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Anders Lie Swedish Road Administration
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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  (Chair)
Anant Bellary
Mark Borlace
Samantha Cockfield
Jon Gibson
John Goldsworthy
Jack Haley
Chris Jones
Steve Spalding
Stella Stocks
Michael Upton
Stuart Worden
Claire Rechichi

Observers
Craig Newland
Linda Schekoske
John White

Visionary research model study
Antonietta Cavallo/ VicRoads
Tricia Williams/ VicRoads
David Healy
Ken Ogden/ VicRoads
Michael Case
Peter Keogh
Statement of Income and Expenditure

Balance as at 1 January, 2009

$ 1,793,981

Income:

Department of Education, Employment and Workplace Relations 945,541
Research: 5,551,782
   Australian Research Council 13,069
   National Health & Medical Research Council 182,372
   Competitive Commonwealth Research 66,500
   State Government Research 3,278,556
   Commonwealth Government Research 187,973
   Local Government 28,955
   Industry Australia Contracts 666,853
   Industry Australia Grants 373,304
   Industry International Research 204,196
   Industry International Competitive Research (1,539)
   Co-operative Research Centres 551,543
   Commercial 646,293
   Internal Grants (Monash Research Support/Strategic Initiatives) 65,263
   Other (inc. Sale of Assets, student fees, transfers) 1 939,036
   Monash University internal transfer 2 1,250,000

Expenditure:

Salaries and related expenditure 5,665,548
Financial and administration 3 495,555
Student related 95,017
Infrastructure related 222,196
Central Support Services - Overhead costs 1,582,726
Other operating expenditure 699,441
Capital expenditure 324,708

Balance at 31 December, 2009

$ 2,106,705

1 Includes funds transferred from MUARC Foundation
2 Accommodation and other services which were previously supplied as in-kind university 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 Auditor. They will be subject to Government audit as part of the University’s annual accounts for the calendar year 2009.

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 2009 for expenditure that will be incurred in 2010.

Certified Correct
Joel Chibert
Group Accountant
Corporate Finance Division
**MUARC Report Series**


**Books and Book Chapters**


**Peer Review Journal Articles**


Other Journal Articles


Peer Review Conference Papers


Driver Distraction Evaluation Tool’, Proceedings First International Conference on Driver Distraction and Inattention, Gothenburg, Sweden


Other Conference Publications


Sponsor/Consultant Reports (restricted access)

Archer, J., Candappa, N. & Corben, B. F. (2009), Dwell on Red Signal Treatment, Monash University Accident Research Centre, Contract report

Archer, J., Young, W. & Corben, B. F. (2009), Testing innovative signal treatments to reduce heavy vehicle crash-risk at metropolitan highway intersections, Monash University Accident Research Centre, Report to VicRoads - Innovative Treatment component of the Safer Road Infrastructure Program, funded by the Traffic Accident Commission (TAC)


Cameron, M. H. (2009), Development of strategies for speed camera enforcement in Queensland: Final report, Monash University Accident Research Centre, Report to Land Transport and Safety Division, Queensland Transport

Cameron, M. H. (2009), Economic evaluation of the introduction of lower rural default and national highway speed limits in Tasmania, Monash University Accident Research Centre, Report to Department of Infrastructure, Energy and Resources, Hobart


Cassell, E. & Prang, K.-H. (2009), Commercial boating safety culture focus group study, Report to Marine Safety Victoria


Cassell, E., Reid, N., Dunn, I., Killian, J. & Hayes, N. (2009), Evaluation of Safe Taxi Rank Trial, Report to Victorian Taxi Directorate, Department of Transport

Clark, B., Cameron, M. H. & Diamantopoulou, K. (2009), Research into aspects of a new Victoria Police traffic enforcement model: Part 2: Best methods to measure the effectiveness of enforcement, Monash University Accident Research Centre, Report to Traffic and Transit Safety Department, Victoria Police

Corben, B. F., Howard, E. & Logan, D. B. (2009), Development of a strategic research and policy framework for road safety in Queensland, Monash University Accident Research Centre, Report to Department of Transport and Main Roads, Queensland

Devlin, A., Charlton, J., Bohensky, M. A., Verdoorn, A. & Oxley, J. (2009), Older driver project: driving simulator study, Monash University Accident Research Centre, Report prepared for the AutoCRC as deliverable C3-02 M051

Diamantopoulou, K., Clark, B. & Cameron, M. H. (2009), Research into aspects of a new Victoria Police traffic enforcement model: Part 1: Review of national and international enforcement activities and models, Monash University Accident Research Centre, Report to Traffic and Transit Safety Department, Victoria Police, Melbourne


Edquist, J., Stephan, K., Wiglesworth, E. & Lenné, M. G. (2009), A literature review of Human Factors safety issues at Australian level crossings, Monash University Accident Research Centre, Report to Department of Transport, Victoria


Reid, N. & Cassell, E. (2009), Evaluation of the Safe Taxi Rank Trial, Hawthorn, Report to the City of Boroondara

Routley, V., Prang, K.-H., Bugeja, L. & O’Hare, M. (2009), Rail suicide: additional research activities 2009, Monash University Accident Research Centre


Taranto, D. & Logan, D. B. (2009), Ongoing maintenance, testing and evaluation of Vehicle #1, Monash University Accident Research Centre, Report for the AutoCRC as deliverable C3-02 M071.
Photo right: Ron Laemmle photographs an accident scene