

MUARC

2016 Annual Report





FOREWORD

from the Senior Vice-Provost and Vice Provost (Research)

It gives me great pleasure to commend to you the Monash University Accident Research Centre's Annual Report. You will read about the significant program of research that is changing safety practices in our communities, workplaces and transport systems. The nature of its work is interdisciplinary and increasingly, MUARC networks are expanding connections with colleagues across Monash, Australia and the world.

The MUARC Graduate Research Program has grown to more than forty PhD and Masters students, and makes a significant contribution to building the next generation of injury prevention researchers.

In partnership with Emergency Management Victoria, the MUARC Disaster Resilience group has championed a Compendium of Community-based Resilience Activities. This is an Australian first, web-based collation of studies, showcasing community initiatives for disasters and emergencies. The project will provide guidance to help build more resilient communities and organisations which are better able to respond in emergencies.

The Injury Outcomes Research group has completed a major project for the TAC evaluating their 2015 Strategy, including more than fifty reports and presentations.

The Victorian Injury Surveillance Unit has produced influential publications, among them its e-bulletin, now up to its 14th edition, and *Hazard*, the 82nd issue of which features unintentional work-related injury, to be published in 2017.

Human Factors in Transport and Workplace Safety team continues to provide important solutions for mining, defence, road safety, workplace and injury outcomes, using research tools and the MUARC car and motor cycle simulator facilities.

In the transport safety domain, research continues on the TAC-funded Enhanced Crash Investigation Study. This project provides the TAC with vital information about contributing factors in run-off-road, intersection and head-on motor vehicle crashes in which injured drivers are admitted to hospital.

The Regulation and In-depth Crash Investigation team have completed a comprehensive review of the scientific literature examining issues relating to driving under the influence of drugs.

The Ozcandrive study led by MUARC's Behavioural Safety Science team moved into its sixth year and will, once completed, provide a detailed understanding of older driver issues.

MUARC's Used Car Safety Ratings, was published for the 24th year in 2006, giving a comprehensive guide to vehicles. This information is most useful for consumers when considering used cars purchases.

The Road Safety Leadership Program, continues to attract senior people from road safety agencies across the world.

In conclusion, all of the above activities have made a significant contribution to our government, industry and community partner efforts towards zero death and serious injury, and I would like to congratulate the Centre's entire academic and professional staff on their achievements and efforts this year. I am looking forward to an exciting 2017 as they celebrate their 30 Year Anniversary and continue to play a crucial role in saving lives around the globe.



Professor Pauline Nestor
Senior Vice-Provost and Vice-Provost (Research)
Monash University





MUARC

The Monash University Accident Research Centre (MUARC) is one of the world's most comprehensive injury prevention research institutions.

We are grounded in scientific and academic excellence, while producing research with real-life implications that translate readily into policy and practice – whether it's understanding contributing factors to older pedestrian falls, studying community preparedness and recovery in the event of a disaster or comparing year-by-year trends in crashworthiness of the private motor vehicle fleet.

MUARC is the home to many vital Monash researchers and groups. Because of the breadth of our research, we have a strong national profile and an international reputation that is growing in prominence.

The Centre identifies emerging injury problems, monitors progress, determines and evaluates solutions and advises government and industry on safety strategies. We encourage our experts to actively collaborate in solving pressing, practical problems – this allows our external partners access to expertise across their fields of interest.

Our research is interdisciplinary and applies a systems framework to address injury prevention needs across three main settings:

- Home and community safety
- Workplace safety
- Transport safety

We have already made Australia – and Australians – safer. Now we are harnessing MUARC's global perspective and experience to help meet the challenges of public health around the world through international collaborative projects, graduate student mentoring and leadership training across Europe, North America, the Middle East, South Africa and Asia.

We also make significant contributions to capacity building and injury prevention initiatives in the Western Pacific Region through our status as a World Health Organization Collaborating Centre for Violence and Injury Prevention. With our colleagues across Monash, we support and promote the principles of the United Nations' Sustainable Development Goals and we are proud to contribute to the global network which strives to bring practical solutions for achieving safe, sustainable and resilient communities. This Annual Report shows our many achievements in 2016.

DIRECTOR'S MESSAGE

This was a major milestone year for the Monash University Accident Research Centre (MUARC). At the beginning of 2016, and following the formal disestablishment of the Monash Injury Research Institute (MIRI), MUARC was reinstated as a discrete entity within the Office of the Senior Vice-Provost and Vice Provost (Research), Professor Pauline Nestor.

As existing teams reconvened under the 'new' organisational unit, there was an opportunity to sharpen our focus around three injury research domains: Transport, Workplace and Home and Community.

The graduate student program continued to grow, and our professional leadership training program expanded in its reach nationally and globally, and drew acclaim as a premier capacity-building event in the road safety and injury prevention calendar.

Significant project milestones were attained and many new research activities commenced as MUARC transitioned into a new era. Indeed, there are many reasons for celebration as we reflect on a year of noteworthy achievements.

A year of important announcements

The Transport Accident Commission confirmed our successful bid to fund the Behavioural Science for Transport Safety Team's Ozcandrive older driver cohort study for a further three years, providing a linked data set of driving, health, functional and crash measures.

Ozcandrive III received \$1.764 million over three years, making this project the world's longest and oldest cohort study of older drivers. The project is delivering important decision tools for clinicians, as well as driver self-awareness tools to facilitate decisions about fitness to drive and to help maintain the safe mobility of older drivers.

In another outstanding success story, we welcomed the news that Adjunct Professor Michael Lenne from Seeing Machines, working with Associate Professor Michael Fitzharris and Professor Tim Horberry, were successful in their application for a Cooperative Research Centre Project (CRC-P) for 'The future integrated driver monitoring solution for heavy vehicles' study. The total project value amounts to just over \$6.5 million over three years and will be shared between Seeing Machines Limited, Monash University and Ron Finemore Transport Services Pty Ltd. The CRC-P will place MUARC on the cutting edge of fatigue and distraction work in the heavy vehicle industry, globally. This is a significant win for all concerned.

Major projects – from strength to strength

The Enhanced Crash Investigation Study (ECIS) entered its third year as the Centre's largest Transport Accident Commission (TAC)-funded project. This continues to be an important collaboration, aimed at understanding the causes of serious injury due to motor vehicle crashes. At the close of 2016, 400 cases were recruited, drawing to a close the data collection phase of the project.

This is an important milestone for the study and represents considerable effort by the nursing, data management and vehicle inspection staff. We will soon farewell those involved in collecting data and I would like to acknowledge their major contributions to this significant research.

The Centre continued its important partnership with the Victorian Country Fire Authority (CFA). Led by Associate Professor Stuart Newstead, the research seeks to contribute to evidence-based policy and practice in community fire safety. Highlights of the research program this year included an analysis of CFA fire incident data and a major review that identified effective countermeasures to prevent residential fires. The CFA is using the project outcomes to target its community intervention programs and reduce the risk of residential fires.

Influential events

MUARC held its fifth and sixth Road Safety Management Leadership Programs at the Monash University Law Chambers in May and November. The programs are designed to develop and nurture the next generation of road safety leaders. These are intensive events, each held over a one-week period. They address road safety leadership and management challenges and equip participants with tools to respond to circumstances that have relevance in developing nations as well as the local (Australasian) context.

The Monash University Disaster Resilience Initiative (MUDRI) hosted its 11th annual Skip Burkle Lecture, presented by Dr John Bates, the Director of the Australian Institute of Disaster Resilience. I was pleased to Chair this most interesting and forward-thinking session titled 'Risk, Resilience, Reform: A way forward for all Australians to strengthen their capacity and build resilience in the event of unexpected emergencies'. It is always a pleasure to participate in the MUDRI Forums, which attract the wide interest and enthusiastic engagement of community and government service providers, educators and leaders in the emergency services sector.

The success of MUARC is largely attributable to the excellence and determination of all its staff and graduate students. I thank them for their support through 2016.

Congratulations (and a fond farewell) in order

As always, we celebrated the success of our people – professional and academic, throughout the year, including a number of promotions and awards. Dr Karen Stephan was promoted to Senior Research Fellow; Dr Sjaan Koppel won the AAAM Elaine Wodzin Young Achiever Award; Dr Eva Alisic was invited to be Co-Chair of the Inter Academy Partnership Project – for the Global Collaboration of Science, Medical and Engineering Academies; Dr Sharon Newman and PhD student, Amanda Warmerdam, were inaugural joint-winners of the Australasian Road Safety Conference 2016 Best Paper sponsored by National Road Safety Partnership Program and, at the same conference, Associate Professor Stuart Newstead received the Peter Vulcan Award for Best Research Paper; and PhD student, Khic Prang, won the Best MUARC Graduate Student Paper Award.

In 2016 we also said farewell to long-serving colleague, Noelene Deveson. Noelene commenced at Monash in 1993 as an Administration Officer in Mechanical Engineering. She moved to MUARC in late 1999, first serving as an Administrative Officer, and later taking on senior support roles as Graduate Research Administrative Officer and Senior Administrative Research and Project Officer. In particular, we acknowledge Noelene's skilful and creative management of scientific seminars and conference events that have showcased MUARC research talent, her advice on project contracts, meticulous documentation and reporting of the Centre's research outputs, and her significant contributions to the University's research management activities. It is these fundamental support activities which help to define the quality, strength and impact of MUARC's research.

We thank Noelene for her significant contributions and wish her all the very best for the future.

A final thought

In her closing remarks last year, Professor Pauline Nestor acknowledged the Centre's long-held reputation for high-impact injury research and expressed confidence in its capacity to grow under the reinstated MUARC. I am pleased to say that MUARC's achievements through 2016 have amply served to justify this view as we continue to provide real-world solutions that are highly valued by our government, industry and community stakeholders, and which make a difference in our quest to reduce the incidence and impact of injury.



Professor Judith Charlton
Director
Monash University Accident Research Centre



BEHAVIOURAL SCIENCE FOR TRANSPORT SAFETY

Led by Professor Judith Charlton, the Behavioural Science for Transport Safety team conducts research into vulnerable road users using a safe systems framework. The unit studies seniors, youth and children who use roads as drivers, passengers, pedestrians, cyclists and motorcyclists.

Ozcandrive III

In 2016, the Ozcandrive project entered its sixth year and its third phase of operation. Ozcandrive is a world-first longitudinal study, tracking the health and driving measures of older drivers as they age. The broad aims are to reduce vehicle-related injuries and death and improve the quality of life of older people by extending their safe mobility.

Together with its Canadian partner, Candrive, the study has followed 928 drivers in Canada and 302 drivers (aged 75 years and older) in Australia and New Zealand. While data collection at the Canadian sites has now finished, investigators from all sites continue to work together on the key analyses. The primary outcome is the development of an objective screening tool to assist clinicians to identify at-risk older drivers, due for completion in 2017.

At the Melbourne site, the study continues to generate rich data, including naturalistic driving patterns recorded through a device installed in participants' vehicles and annual measures of functional ability, medical conditions and self-reported driving practices. The findings will answer questions about how older people's driving changes over time and how declining health and functional ability can influence driving.

Ozcandrive III will continue for three further years with significant funding (\$1.74 million) from the Transport Accident Commission (TAC) and with the generous support and collaboration of all the project partners and investigators. The next phase will allow three PhD students to complete important research on the world's oldest and longest-running cohort of drivers.

Further insights into older drivers

Dr Sjaan Koppel, with Associate Professor Michael Fitzharris, Associate Professor Stuart Newstead, Angelo D'Elia and Professor Judith Charlton, have made significant progress on the program of research examining older road user crashes and associated risk factors. Commissioned by the MUARC Baseline Research Program, this project has linked multiple data sources to provide important insights into the frequency, severity and associated costs of crashes involving older road users.

Highlights for 2016 included using the TAC/MUARC enhanced linked dataset to document the historical crash involvement patterns for older road users, as well as using full records from the Coroners Court of Victoria for a more in-depth analysis of fatal older road user crash risk factors.

Findings from this research program will be used to guide road safety policy and inform development of future action plans to reduce older road user crash-related injuries and deaths.

The Child Safety in Cars project

Another continuing research focus for the team was child passenger safety. The Child Safety in Cars project uses naturalistic driving methods to observe children as rear seat occupants during real-world car trips. This is a large-scale international collaboration through the Australian Research Council Linkage Scheme and brings together researchers from Monash University, the Children's Hospital of Philadelphia Research Institute, University of Michigan Transportation Research Institute and Chalmers University of Technology.

Child restraint systems for vehicles are designed to provide specialised protection for child occupants in the event of a crash. However, children do not sit perfectly still or behave like a crash test dummy while travelling in vehicles. This can lead to inappropriate seating positions that may compromise children's safety if a crash were to occur, and may also distract the driver.





Ms Samantha Bailey Project Administration
Ms Phuong Hua Research Assistant
Associate Professor Jennie Oxley Associate Director
Ms Jenny Kwong Technical Officer
Ms Thai Hoa Hiep Pham Research Assistant
Mr James McCutcheon Technical Officer
Professor Judith Charlton Director
Mr Yik-Xiang Hue Lead Technical Officer
Ms Lorraine Atkinson Project Manager
Ms Raphaela Schnittker PhD Student
Dr Sjaan Koppel Senior Research Fellow
Mr Ben Wilson Technical Officer

Outcomes of this project will be used to optimise vehicle and child restraint system design and develop targeted safety education strategies to mitigate injury to children in the event of a car crash.

In 2016, project partners at the Children's Hospital Philadelphia led the team's activities to quantify children's out-of-position status. Together with detailed video analysis by PhD candidate Suzanne Cross, these findings were used to design a series of sled tests (simulated off-set frontal crashes) which were conducted by the project partners Autoliv (Sweden) and Britax (Australia). Using child crash test dummies, the sled tests identified the potential injury implications of children's out-of-position status.

PhD candidate Jonny Kuo also contributed to the analysis of parent/driver distraction component of the project using novel automated processing of in-vehicle speech and driver head position data. Jonny submitted his thesis towards the end of 2016 and was awarded the degree of PhD in early 2017.

ANDS another thing...

The Behavioural Science for Transport Safety and Human Factors teams were crucial participants in another Australia-first study into everyday driving behaviour, the Australian Naturalistic Driving Study (ANDS). The project is a ground-breaking new national collaboration which uses advanced sensors and data-logging technologies to examine the behaviour of drivers, their cars and other road users in the real world.

In total, 380 volunteer drivers aged between 20 and 70 (in Victoria and New South Wales) will participate in the research and have their cars fitted with a Data Acquisition System (DAS) to record their driving over a four-month period. The DAS is a unique device comprising sensors and dataloggers including video, acceleration in multiple axes, gyroscopic motion, indicator status, speed, radar and GPS position that allows the continuous recording of vehicle and driver-based data. In December, the MUARC team celebrated its 100th DAS installation; recruitment will continue into 2017.

Professor Judith Charlton heads the MUARC-based ANDS team with Dr Kristie Young, Dr Sjaan Koppel, Technical Officers, Yik-Xiang Hue and Andrew Lyberopoulos, and Research Assistant, Rachel Osborne with the competent support of a very large group of technical and research assistants.

The project receives funding from the Australian Research Council through the Linkage Scheme and is led by the University of New South Wales in collaboration with Monash University, Queensland University of Technology, the University of Adelaide, Curtin-Monash Accident Research Centre and Virginia Tech (USA). Government and industry partners include the Centre for Road Safety at Transport for NSW, NRMA, the Transport Accident Commission, VicRoads, the Motor Accident Commission in South Australia, the Western Australian Office of Road Safety, Seeing Machines and Hyundai Australia.

ANDS data will allow researchers to study how drivers deal with hazards, including busy intersections that have no traffic lights and difficult driving situations such as pedestrians unexpectedly crossing the road or other drivers engaging in risky behaviour. As the data begins to flow in from the first two waves of participants, the research team will begin the large analytical task of learning how people avoid collisions or other safety-related incidents in everyday driving.





A first-of-its-kind cycling study

Cycling safety assumed an increasingly important place within MUARC's research portfolio, in response to the growth of commuter and recreational cycling activities on Australia's road system.

Associate Professor Jennie Oxley leads the four-year study funded through an ARC Linkage Grant in partnership with Main Roads Western Australia, VicRoads, Transport Accident Centre, Amy Gillett Foundation, Cycling Promotion Fund, Monash's Institute of Transport Studies (Civil Engineering), Monash's Emergency and Trauma Research Unit, and the Curtin-Monash Accident Research Centre.

This is the first comprehensive study in Australia that combines academic, government and community efforts to enhance cycling activity while addressing key safety concerns.

The four-staged project is run in Melbourne and Perth and has been in operation for almost two and a half years. Some highlights of the study include:

- Completion of the Melbourne naturalistic study data collection.
- Commencement of in-depth analysis of naturalistic data.
- Development of BikeSim and commencement of a study assessing geometric design of cyclist lanes.
- Publications have been drafted
- Case group interview findings:
 - Hierarchical classification of road infrastructure
 - Computer vision for bicycle lane width and lateral position estimation
 - Development of a virtual reality bicycle simulator for road safety research
- Conferences, seminars:
 - Invitation to workshop on Naturalistic Cycling Analysis and ICSC2016 (Italy, 2016)
 - Transportation Research Board Annual Meeting (Washington DC, January 2017)

Plans for the next phases are now in place and include expert panel workshops, development and evaluation of infrastructure prototypes.

The medical review process for substance-impaired drivers study

Associate Professor Oxley led a study funded by the New Zealand Transport Agency (NZTA), examining the role of substance-impaired driving (SID) on medical review processes.

The medical review process and supporting referral systems are designed to identify use of 'high risk' medications, illegal drugs and poly-drug use. It also aims to manage licensing pathways and outcomes of medically at-risk and SID cases. An in-depth understanding of the issues surrounding the prevalence, identification and management of key medications and illegal drugs is an important step in order to develop evidence-based processes to improve the management of SID through the licensing system.

The results of this study will inform recommendations for the improvement of medical review processes and complementary education initiatives. These will be used for identification of SID cases by stakeholders and referral agencies (professionals across health, transport and enforcement sectors).

Roots spread on CEDAR study

Despite the high prevalence of cataract among the older population, there is limited evidence on the effect of first and second eye cataract surgery on driving outcomes. The Cataract Extraction and Driving Ability Research (CEDAR) study will examine the association between clinical measures of vision, refractive management, driving patterns, self-regulation and driving performance for bilateral cataract patients before first eye surgery, between surgeries and after second eye surgery.

The study is led by Professor Lynn Meulenens at the Curtin-Monash Accident Research Centre and is funded through the Australian Research Council's Discovery Grant Scheme. Data is being collected in Western Australia and Victoria. To date, around 150 patients have been recruited, with 40 participants at the Melbourne site. The results will inform ophthalmology and licensing authorities regarding surgical and refractive management as well as fitness to drive assessments for older drivers with bilateral cataract.

MONASH UNIVERSITY DISASTER RESILIENCE INITIATIVE

Led by Emeritus Professor Frank Archer, the Monash University Disaster Resilience Initiative (MUDRI) reflects a multidisciplinary team with industry and academic experience in emergency public health, anthropology, emergency management, social science and disaster risk reduction. The team comprises Dr Caroline Spencer, Dr Debra Parkinson, Mr Dudley McArdle, Dr Saadia Majeed and Ms Samantha Bailey.

As a rapidly evolving field of study and research around the globe, disaster resilience contributes to MUARC and the emergency management community through the Monash University Disaster Resilience Initiative (MUDRI). Launched in 2012, the unit dates back to 2005 where it had its origins in the Faculty of Medicine, Nursing and Health Sciences.

Research outputs

During 2016, the MUDRI team worked on a number of research grants and publications:

Australian Government Attorney Generals Department

National Emergency Management: Project including literature reviews on recent disaster reviews in an Australian context and a bottom-up approach to community resilience.

Victorian Inspector General for Emergency Management

Pragmatic Literature Review: How does the government and the emergency management sector collaborate with the private sector and community organisations?

Women's Health Goulburn North East

An Evaluation of Lessons in Disaster: Educating for resilience through men's and women's experience of disaster.

PlanSmart

Project Evaluation Report of PlanSmart Emergency Ready Business Program for Murrindindi Shire Council.

Research Publications

Three publications, three reports to funders and contributions to the National Gender in Disaster Guidelines, led by Adjunct Research Fellow, Dr Debra Parkinson.

Graduate education

In 2016, the MUDRI higher degree by research program comprised 11 students in the Masters by Research and seven in the PhD program. All MUDRI students remain on track with candidature milestone achievements. Students from both cohorts attended two successful one-day colloquia and engaged with national and international leaders in the field.

MUDRI welcomed 57 coursework students from the Master of International Development Practice and Master of Nursing during the year. The continued academic and professional support from the Faculty of Arts was greatly appreciated. Faculty staff facilitated the new academic governance arrangements introduced in 2015 and invited MUDRI to continue to deliver these unique units that have contemporary and global significance. Students in first semester rated the two MUDRI units as being in the top 8% of all units across the university.

The second Claire Zara Memorial Lecture was held at the 2016 Emergency Services Foundation Conference. Professor Caroline Taylor AM, PhD presented this keynote presentation.

International exposure

The international exposure of MUDRI continued to grow. MUDRI staff made two presentations at the World Safety Congress in Tampere, Finland. Professor Frank Archer continued as a Board member of the Asia Pacific Disaster Medicine Conference and as a member of the World Association for Disaster and Emergency Management's (WADEM) Prehospital and Disaster Medicine Editorial Board. Dr Caroline Spencer continued in her role on the WADEM Regional Oceania Chapter Council. Joe Cuthbertson continued to co-chair the WADEM EMS Section.

In an exciting new collaboration with the University of Greenwich, London, MUDRI will undertake research on using computer support to increase community-based resilience and preparedness in the event of an unexpected emergency.

Professional outreach

The professional outreach of MUDRI extends to membership of the:

- Steering Committee, National Emergency Management Higher Education Framework Project, which is led by Queensland University of Technology, and subsequently membership of the AGD-based National Disaster Resilience Education Alliance.
- State Gender in Disaster Taskforce, hosted by the Victorian Emergency Management Commissioner.
- Gender & Disaster Pod, in partnership with Women's Health Goulburn North East and Women's Health in the North.

Launched in 2015, the MUDRI/Emergency Management Victoria Compendium on Community-Based Resilience Activities, a first-in-Australia initiative, continues to grow strongly, collating studies to help communities develop their resilience, particularly in the setting of disasters and emergencies.

MUDRI continued its quarterly, research-driven Forums, now in their eleventh year. In 2016, the unit held three Forums:

- Disaster Resilience Initiatives at Local, State, National and International levels (March).
- Progressing Community-based Resilience (July).
- Risk/Reform/Resilience, including the 5th Annual MUDRI Research Symposium (November).

As a highlight of the November Symposium, Dr John Bates, Director, Australian Institute for Disaster Resilience (AIDR) presented the 11th Annual Professor 'Skip' Burkle Jnr Keynote Lecture, titled 'New Institute, new directions, new opportunities'. A welcomed innovation from AIDR, was the funding for 30 scholarships for people in unpaid community positions to attend Forums during 2016.

Forum participants continue to provide excellent feedback for the content, structure and choice of speakers.

Five years at MUARC

The MUDRI team were delighted to celebrate five years at MUARC in 2016. This milestone presented leaders with the opportunity to thank the many staff who have championed the unit's success. MUDRI's strength lies in its people and network; it is stronger for having their support as it continues its mission to build the resilience of many communities in the face of unexpected emergency events.



ENHANCED CRASH INVESTIGATION STUDY

The Transport Accident Commission (TAC)-funded Enhanced Crash Investigation Study (ECIS) continued its research in 2016. ECIS aims to provide the TAC with the evidence-based road safety countermeasure options to target and reduce the number of serious injury crashes in Victoria.

By the end of 2016 the ECIS team reached its goal of investigating 400 serious injury crashes. During 2016, the ECIS team examined 202 crashes, ranging from run-off-road crashes and crashes at intersections to head-on crashes. These crashes all resulted in drivers being admitted to hospital.

As part of the ECIS program, the 'control arm' continued throughout 2016. This involves studying vehicles and drivers at known crash sites who did not experience a crash. In 2016 the ECIS team attended 129 known crash sites and recorded information on 2,291 vehicles, with comprehensive surveys received from 672 drivers. This provides the study team with an understanding of differences between drivers that crash and those who do not.

ECIS will continue into next year with key findings to be delivered to the TAC in 2017.

Events aplenty

ECIS hosted four successful events during the year:

Annual MUARC-TAC Road Safety Seminar

The Annual MUARC-TAC Road Safety Seminar, held at the RACV Club and attended by 288 people, was opened by The Honourable Luke Donnellan MP, Minister for Roads and Road Safety, and Minister for Ports, and featured a keynote presentation from Professor Claes Tingvall (Äf, Sweden; Adjunct Professor, MUARC) and Associate Professor Anders Lie (Swedish Transport Administration).

Presentations focused on the role of vehicle technology in preventing crashes, the Safe Systems paradigm and Towards Zero goals, as well as issues impacting vulnerable road users (including pedestrians and cyclists). Two moderated panel sessions were also held. Speakers came from the University of Michigan Transportation Research Institute, the School for the Future

of Innovation in Society at Arizona State University, Loughborough University (UK), Virginia Tech (USA), The Alfred Hospital and the Royal Melbourne Hospital.

Safe Systems I

This six-day event held in August brought together a range of experts from diverse road safety fields along with the ECIS team to discuss approaches to analysing ECIS cases in line with the Safe Systems philosophy. Attendees included Dr Johan Strandroth from the Swedish Transport Administration, as well as representatives from the TAC, Victoria Police, VicRoads, Corben Consulting, the Queensland Department of Transport and Main Roads and MUARC.

Safe Systems II

Held in November, this event represented an extension to Safe Systems-I where further development of the safe systems framework was achieved. It was attended by the ECIS Investigators, the TAC, and a host of experts from within Victoria, as well as government representatives from Queensland, NSW, WA and the Commonwealth. This group discussed in detail a selection of ECIS crashes. The purpose was to understand all possible measures that could be implemented to prevent the crash and, were the crash likely to occur, define what measures could be implemented to reduce the severity of injury. Central to the thinking was the concept of boundary conditions and the safe systems model, with Professor Claes Tingvall providing enormous insight. Safe Systems-II established a new paradigm to analyse the ECIS data.

Regional Panels

ECIS hosted panels in Bendigo, Healesville and Ararat. Over the three events, 79 people from agencies such as local council, Victoria Police, the SES, Paramedics and VicRoads discussed crashes in each region, using the Safe Systems approach.

HUMAN FACTORS IN TRANSPORT AND WORKPLACE SAFETY

Members of the Human Factors team come from various disciplines – psychology, design, computer science, engineering – and bring diverse knowledge to a unit interested in topics such as how people safely drive vehicles or interact in complex work systems. The team uses human-centred methods to deliver a wide-ranging approach to accident prevention. We focus on safe design and user-centred evaluation of systems, equipment, tasks and environments.

In 2016, the unit continued to focus on safety in areas such as road transport, mining, medical, defence and the workplace.

Making mining a safer industry

The team made substantial progress on many of the projects that were commenced or in their nascent stages during 2015. One of those is the work of Professor Tim Horberry in collaboration with ergonomists from the University of Queensland and National Institute for Occupational Safety and Health (NIOSH) in the USA, which is funding the project. It aims to produce a roadmap for human-centred design of mining equipment. This includes developing design material, case studies, and educational information for use by the minerals industry.

Also in the field of mining, Dr Kristie Young and Professor Horberry worked on a project looking at interface design for proximity detection systems in coal industry vehicles. Members of the team also undertook consultancy work for Rio Tinto in Mongolia, considering human error and traffic management, as well as conducting a risk assessment.

Improving army teamwork

In the area of the defence, Professor Horberry in Melbourne and Ben Hoggan in Adelaide worked with the Defence Science and Technology Group, part of the Commonwealth Department of Defence. Their two projects centred around understanding team performance and associated performance-shaping factors in land vehicle systems.

In 2016 the research progressed from lab-based work to scenario- and field-based naturalistic research. As part of the work, the team has helped design different exercises involving teams of soldiers and studied how communications and leadership within the teams could be improved.

Award-winning work in workplace road safety

Workplace road safety continued to be another key focus area for the team. Led by Dr Sharon Newnam, the major research projects undertaken during 2016 included:

- The successful completion of a large study funded by the NHMRC on managing the risks of workplace road safety.
- A study in conjunction with the University of Michigan Transportation Research Institute (UMTRI) on automation and safety culture in the heavy vehicle industry.
- A second study in collaboration with UMTRI looking at older heavy vehicle drivers.
- The Transport and Logistics Industry Health and Wellbeing Study, which incorporated Linfox.

In the same area, the team worked on a driver and supervisor training program with Mars Australia and won two awards (for best research papers) at the 2016 Australian Road Safety Education and Policing Conference.

Injury outcomes work improving lives

For Dr Dianne Sheppard, whose work covers injury outcomes, 2016 was also a busy and productive year. She presented at high-profile conferences in The Netherlands (The Work Disability Prevention Implementation Conference in Amsterdam) and Australia (The International Congress of Behavioural Medicine in Melbourne) and worked on several projects. One of those, with the NSW State Insurance Regulatory Authority, involves the development and testing of a fast-track recovery app.

Simulators as popular as ever

MUARC's driving and riding simulators, which the team is responsible for, remained an integral element in the work of the Human Factors unit during the year. The portable, car, cycle, motorcycle and defence simulators were used steadily throughout 2016 and attracted strong interest for the many local and international visitors touring Monash facilities.

Projects undertaken by team members Nebojsa Tomasevic and Christine Mulvihill included investigating vehicle automation and transfer of driver control, and fitness to drive for patients who have recently had upper limb surgery.

Plans for a major truck simulator commenced in 2016, and development of this facility will begin in earnest in 2017.

Congratulations to Dr Kristie Young

In 2017, Dr Kristie Young will commence her fellowship funded by the Australian Research Council's Discovery Early Career Researcher Award (DECRA), focusing on distraction and inattention, while others will explore road infrastructure issues, speeding and fatigue (which are implicated in many collisions). The results will provide critical new insights for improving driver training, licensing procedures, as well as vehicle and road infrastructure design.



INJURY ANALYSIS AND DATA

Led by Associate Professor Stuart Newstead, the Injury Analysis and Data (IAD) team's expertise lies in highly analytical data-driven safety research. The team's researchers are specialists in numerical and behavioural sciences, possessing the ability to manage, analyse and present accident and injury data that produces 'real-world' benefits. Collecting, analysing and interpreting data with accuracy, rigour and insight is essential to the safety sciences, and this expertise brings about collaborations with leading public and private organisations across Australia and the world.

Used Car Safety Ratings approaches 25th anniversary

During 2016 the team continued to deliver a strong program of research into vehicle safety performance. The program was headlined by the 24th annual publication of the Used Car Safety Ratings (UCSR), produced by Associate Professor Stuart Newstead and Linda Watson. This comprehensive guide gives consumers information on the safety of their current vehicle and any used vehicles they are considering buying based on real-world crash outcomes. Coverage of the vehicle fleet by the ratings increased significantly this year due to enhancements to the data system underpinning the ratings.

Using the information from the ratings data system, Associate Professor Newstead, Laurie Budd and Associate Professor Mike Keall completed a project estimating the impacts of vehicle safety improvement on overall road trauma in Australia and New Zealand over the past decade. The project also estimated likely future impacts of vehicle safety improvements, including the potential additional benefits of increased uptake of new crash avoidance technologies such as Autonomous Emergency Braking and Lane Departure Warning Systems. Results of this study have been pivotal in assisting state government agencies across Australasia to set vehicle safety strategies.

The influence of the UCSR system was particularly evident in New Zealand; the New Zealand Accident Compensation Corporation fully implemented a new differential vehicle insurance levy for its road crash insurance scheme after a period of community consultation. All ACC vehicle insurance levies are now based on the UCSR data; the aim is to encourage purchasers to choose safer cars through discounted insurance levies for higher rating vehicles.

Important work on imported vehicle safety

Knowing that the Australian Commonwealth Government is considering the issue of used and private vehicle imports into Australia, and New Zealand is continuing to see high numbers of used vehicle import, the IAD team completed a study into the likely safety effects of used vehicle imports in both countries. MUARC was able to contribute directly to Ministerial Round Table discussions based on this evidence.

Reducing motorcycle crash trauma

Analysis of the Data collection for the Managing Increasing Challenges in Motorcycle Safety in-depth crash study continued, led by Dr Trevor Allen and Dr Karen Stephan. The research is estimating the influence of the role of rider, motorcycle and environmental factors in determining motorcycle crash risk. Motorcycle road trauma increased across Australia in 2016, and results from the study will be critical in developing evidence-based policy and countermeasures aimed at reducing motorcycle trauma in the future.

Baseline Research Program - benefiting all of Victoria

The IAD team continued to provide input into Victorian road safety strategy through its involvement in the MUARC Baseline Research Program. Research was completed identifying target demographics for the introduction of Intelligent Speed Advisory systems – the goal is to create the possible reduction in crashes by assisting drivers with speed limit compliance.





Dr Carlyn Muir Research Fellow

Ms Laurie Budd Research Assistant

Ms Belinda Clark Research Fellow

Associate Professor Stuart Newstead Associate Director

Dr Karen Stephan Research Fellow

Mr Angelo D'Elia Research Assistant

In collaboration with other MUARC teams, the IAD team contributed to the development of a comprehensive road safety data system to investigate older road user safety, a growing problem in Australia and around the world due to ageing populations.

Work was also completed identifying strategic priorities for road safety countermeasures to address road trauma in outer urban areas. Outer urban areas of Melbourne were identified to have significantly different travel and crash patterns, demanding strategic responses which are different to those developed for the rest of Melbourne or regional areas.

Angelo D'Elia and Associate Professor Newstead assisted with the development of future strategic directions for road safety detailed in the Victorian Government's Towards Zero road safety strategy release in 2016 by developing a time series model of underlying road trauma trends.

Assisting the government with road traffic policing

With the assistance of the MUARC IAD team, the Victorian Department of Justice and Regulation are developing new strategic directions for road traffic policing in Victoria. In particular Professor Max Cameron, Associate Professor Newstead and Belinda Clark have undertaken a number of projects during 2016 to provide research evidence underpinning the strategy development. These include:

- Development of a Traffic Enforcement Resource Allocation Model that provides quantitative evidence on the benefits of investment in various road policing activities and technologies to reduce Victorian road trauma.
- Evaluation of alternative mobile speed camera scheduling protocols aimed at increasing mobile camera effectiveness in reducing road trauma.
- Evaluation of the road safety benefits of fixed freeway speed cameras and the development of a protocol for the selection of future fixed speed camera sites that will maximise trauma reductions.

The team also undertook a world-first evaluation of the road safety effects of the Automatic Number Plate Recognition system currently in use by police forces around the world.

Research continuing beyond state borders

Enforcement research undertaken by the IAD team extended to other jurisdictions. Building on its comprehensive evaluation of the Western Australian traffic enforcement camera program, the IAD team led the development of protocols for future expansion of the fixed camera elements of the Western Australian program. Professor Cameron and Associate Professor Newstead were also commissioned to further evaluate the effectiveness of the Queensland traffic camera program.

Five-year P Drivers Project about to yield results

Final analysis of the outcomes of the P Drivers Project commenced. This is one of the largest trials ever undertaken of an adult education-based road program aimed at improving the safety of novice drivers. The trial has been running for nearly five years and the results will be available in early 2017. They will provide an interesting contrast to the evaluation of the New South Wales Safe Driver Course (SDC), also being undertaken by the IAD team, and delivered during the learner rather than probationary driver phase.

Award-winning evaluation into Victorian road infrastructure

Associate Professor Newstead and Laurie Budd completed an interim evaluation of Stage 3 of the Victorian Safer Roads Infrastructure Program, a \$750 million investment in road improvement at more than 500 sites across Victoria. The evaluation won the best research paper prize, awarded in the name of MUARC's founding Director Peter Vulcan, at the Australasian Road Safety Research Conference. Results of the evaluation will inform the further \$1.4 billion investment in road infrastructure safety treatments planned for Victoria over the next 6 years.

Decreasing non-fatal serious crash injuries

In order to better identify and reduce non-fatal serious injuries, Mr D'Elia and Associate Professor Newstead continued their work in data systems and injury metric development. A review was undertaken for the Centre for Road Safety in New South Wales on the available linked road crash and hospital admissions data. The IAD team also provided similar advice in Victoria through a collaborative project with the TAC and Department of Health and Human Services.

Home and community research

Beyond the field of road safety, Dr Carlyn Muir, Angelo D'Elia and Associate Professor Newstead developed their collaborative research program with the Victorian Country Fire Authority (CFA). Research in 2016 focused on a series of projects relating to residential fires. The team established a methodology to estimate the cost of residential fires in Victoria, undertook a literature review to identify effective countermeasures to prevent them and analysed CFA fire incident data to establish factors affecting both the risk of residential fire occurrence and the severity of outcomes from the fire.

The CFA is using the residential fire project outcomes to target its community intervention programs and reduce the risk of residential fires through a GIS-based heat map approach. A further project provided a review of best practice countermeasures focused on the significant problem CFA has with vehicle collisions.





INJURY OUTCOMES RESEARCH

The Injury Outcomes Research group aims to help injured people receive better healthcare by researching how they react to, respond to and cope with injury and trauma. Researchers within the team have expertise across fields such as medicine, epidemiology, statistics, psychology, health promotion and population health. They work closely with the Institute for Safety, Compensation and Recovery Research (ISCRR), WorkSafe Victoria, the Transport Accident Commission (TAC), as well as injury-focused stakeholders throughout the world.

The team

Members of the Injury Outcomes Research Unit include Associate Professor Michael Fitzharris, Dr Sjaan Koppel, Dr Janneke Berecki-Gisolf, Dr Sharon Newnam, Dr Carlyn Muir, Dr Dianne Sheppard, Voula Stathakis and Sara Liu. Khic Prang, who completed her PhD in 2016, travelled to Finland to present her work at the World Injury Conference.

TAC 2015 project completed

One of the largest projects the Injury Outcomes Research Unit has worked on over the last six years was the Evaluation of the TAC 2015 Strategy, funded through ISCRR. The project commenced in 2010 and throughout its term more than fifty reports and presentations were delivered to the TAC. The final two reports were completed in 2016.

The first was 'Implementation of the TAC 2015 Strategy: Insights and implications for future claims management' and was authored by Associate Professor Fitzharris and Sara Liu.

The second report was 'The Transport Accident Commission Independence Model: An Evaluation of the Independence Plan', authored by MUARC researchers, Associate Professor Fitzharris, Sara Liu, and Anna Devlin, Professor Alex Collie (ISCRR) and Professor Belinda Gabbe (Department of Epidemiology and Preventive Medicine). The report found that "in designing and implementing the [Independence Model], the TAC are at the forefront of world's best practice in caring for seriously injured persons."

Data linkage on work-related injury – first phase complete

The hospital data linkage study is a multi-phase project funded by WorkSafe Victoria through the Institute for Safety, Compensation and Recovery Research (ISCRR). The study is designed to determine the impact of pre-injury health on short-term (up to two years) and long-term (up to seven years) outcomes of work-related injury.

Pre-injury health is captured in terms of chronic disease indicators, developed for this project from ICD-10-AM coded admissions data. Injury outcomes include claim duration, time off work, health service use, but also long-term morbidity and mortality. The team of investigators on this project are Dr Berecki-Gisolf and Voula Stathakis (MUARC), as well as Dr Behrooz Hassani Mahmooei (ISCRR).

In 2016, the first phase of the study was completed, resulting in a report titled 'The impact of pre-injury physical health and health service use on primary and secondary outcomes'. The analysis is based on a linked dataset of over 49,000 workers' compensation claims with hospital admissions and Emergency Department presentations that took place in the years prior to and following the workplace affliction.

The next phase of the study will include linkage of workers' compensation claims to hospital admissions and death data for a period of up to seven years after the injury. This linkage will take place in 2018. The aim is to determine the effects of work-related injury on chronic disease incidence and health service use, as well as the impact on mortality.

Progress made in occupational rehabilitation collaboration project

An ongoing collaboration involving Dr Dianne Sheppard of MUARC, Dorothy Frost of IPAR Rehabilitation and industry partner, Swiss Re is seeing progress being made in occupational rehabilitation service provision to important client groups. They include groups within the disability employment services, the workers compensation and health insurance settings.

Funding is currently being sought to facilitate the development of these tailored health coaching and assessment services, their implementation and evaluation.

Injury recovery app gets funding

The Motor Accident Authority (MAA) in New South Wales provided funding to the unit to undertake an innovative project that aims to develop an app to promote active and self-managed recovery for those with mild to moderate injuries following a motor vehicle accident.

The project seeks to both develop and evaluate the prototype of a purpose-designed, interactive 'Fast-Track Recovery' application. The app will identify, using an e-screening tool, those who have lower levels of self-efficacy around managing their return to health and aims to facilitate recovery and minimise the risk of prolonged disability for those individuals.

Following this preliminary project, the research team intends to further tailor and develop the app for other contexts within injury outcomes. The research is a collaboration between Dr Dianne Sheppard at MUARC, Professor Ian Cameron of the John Walsh Centre for Rehabilitation Research at the University of Sydney and Associate Professor Venerina Johnston of the University of Queensland.

PHD AND MPhil CANDIDATES

MUARC is committed to research training for the development of new leaders in the field of injury prevention. Graduate students at MUARC study in an emerging and collaborative environment with a diverse range of highly skilled researcher and injury prevention practitioners. The program at MUARC is vibrant and staff and students have the opportunity to participate at all levels in mainstream Monash higher degree activities, including Monash Graduate Education (MGE) Skills Essentials for students and Masterclasses for supervisors.

The academic program reflects the multidisciplinary nature of MUARC. In 2016 there were 31 PhD students and 13 Masters students. Students pursue topics that reflect the breadth of research themes across the Centre within our 3 priority areas: transport, workplace, and home and community.

Transport

Name	Project Title	Supervisors
Inam Ahmad	Criteria for child safety features in vehicle	Sjaan Koppel Brian Fildes
Samantha Buckis	Young driver and crash risk factors – event data recorders shedding new light on speeding behaviour	Michael Fitzharris Michael Lenne Amanda Stephens
Nimmi Candappa	Understanding the crash dynamics of wire rope barrier in the context of Safe System ideas	Brian Fildes Ian Johnston
Belinda Clark	Unlicensed driving in Australia	Stuart Newstead Jennie Oxley Mark Stevenson
Suzanne Cross	Children in cars: The role of in-vehicle behaviour in child occupant protection	Jude Charlton Sjaan Koppel
Mohammad Ibrahim	Scientific approach for road safety strategy framework	Brian Fildes David Logan
Jonny Kuo	Driver distraction: behavioural markers for performance impairment in naturalistic driving	Jude Charlton Sjaan Koppel Missy Rudin-Brown
Brendan Lawrence	Understanding the nature of unreported bicycle incidents	Jennie Oxley David Logan Mark Stevenson
Hayley McDonald	The contribution of drugs and alcohol in serious injury crashes	Michael Fitzharris Amanda Stephens
Dianne McGregor	Driver-centred design for backover collision prevention	Tim Horberry Brian Fildes
Steve O'Hern	Urban cyclist safety: An investigation of how the urban road environment impact cyclists safety	Jennie Oxley Mark Stevenson
Jianrong Qiu	Exploring the road safety impacts of bus safety inspections	David Logan Jennie Oxley Christopher Lowe
Maatje Scheepers	Early identification of mental health needs of injured road users	Dianne Sheppard Sharon Newnam Meaghan O'Donnell
Nebojsa Tomasevic	Investigation to transfer control from automated vehicles to the driver	Tim Horberry Brian Fildes
Jessica Truong	Safe systems and safety culture - How to move Towards Zero	Ian Johnston Stuart Newstead
Luke Valenza	Older passengers and falls in trams	Jude Charlton Jennie Oxley Selby Coxon

Workplace

Name	Project Title	Supervisors
Ivan Cikara	Has the 'Chain of Responsibility' legislation improved road transport safety?	Sharon Newnam Sjaan Koppel

Name	Project Title	Supervisors
Sarah-Louise Donovan	Safety culture and leadership: Examining the influences for improved safety outcomes in high risk organisations	Tim Horberry Michael Lenne Paul Salmon
Amanda Warmerdam	Work related road traffic injury: Managing the risk	Sharon Newnam Di Sheppard Mark Stevenson
Mohammed Aburumman	Assessing the correlation between safety culture and workplace accidents	Sharon Newnam Brian Fildes
Raphaela Schnittker	Cognitive Systems Engineering in Anaesthesia: Developing a decision-making support tool for airway management	Stuart Marshall Tim Horberry Kristie Young

Home and Community

Name	Project Title	Supervisors
Janne Bowen	Building and strengthening resilience in communities prior to emergencies	Frank Archer Caroline Spencer
Joanne Briggs	Quality project evaluation of the Army Aboriginal Community Assistance Program from a military participant perspective	Frank Archer Leanne Boyd
Angela Clapperton	Victorian suicides: Investigating the presence and nature of mental illness and exploring pathways to suicides	Stuart Newstead Lyndal Bugeja Jane Pirkis
John Coleman	Does collaborative planning for general practices contribute to a more resilient emergency response?	Frank Archer Caroline Spencer
Joseph Cuthbertson	Disaster risk and the social determinants of health	Frank Archer Ian Jacobs Andrew Robertson
Susan Davie	How prepared is Australia to protect children in emergencies?	Frank Archer Eva Alisic Noel Cranswick
Craig Fersuson	Recent major national natural disasters have identified inadequacies in crisis leadership at the incident control level	Frank Archer Tony Pearce
Tharanga Fernando	The injury comorbidity index study	Janneke Berecki-Gisolf Mohammad Ansari Stuart Newstead
Shannon Gray	Identifying injury causing hazards in fitness facilities	Caroline Finch Kevin Norton Betul Skendiz
Frances Haire	Analysing perceptions of floods in Australia to inform behaviour change	Frank Archer Douglas Paton Deanne Bird
Roger Jones	Developing a practical tool to help individuals and communities in assessing and managing emergency risk	Frank Archer Caroline Spencer
Ravathi Krishna	A cross cultural comparison of Child Centred Disaster Risk Reduction (CC-DRR) strategies in India and Australia	Eva Alisic Kevin Ronan
Tim Lathlean	Training loads, player wellness and injury risk in elite junior Australian football players	Caroline Finch Stuart Newstead Paul Gastin
Dudley Mc Ardle	The community's contribution to the shared responsibility for a national disaster resilience	Frank Archer Caroline Spencer F(Skip) Burkle
Heather Moody	Humanitarian guidelines and frameworks within the Australian disaster management context	Caroline Spencer Carlyn Muir
Bianca Olstein	A comparative study of the emergency response to mass casualty incidents and disasters between Israel and Australia	Frank Archer George Braitberg
Matt Pepper	Disaster resilience and emergency response	Frank Archer F(Skip) Burkle
Suresh Pokharel	Multiple stresses and urban vulnerability: Why and how building resiliency should be a focus	Frank Archer F(Skip) Burkle
Mark Potter	Examining the response and recovery interface with the aim of improving community resilience	Frank Archer Greg Leach
Adam Poulter	Professionalisation of the international humanitarian workforce – what are the barriers and opportunities	Frank Archer F(Skip) Burkle
Fiona Roberts	Investigation into measuring disaster resilience recovery	Frank Archer Caroline Spencer
Kate White	An investigation of the changing nature of “community resilience” as a contemporary issue with the Victorian emergency management sector for shared understanding and shared responsibility	Frank Archer Caroline Spencer
Diana Wong	Disaster health evaluation	Caroline Spencer Frank Archer Leanne Boyd

Highlights

In 2016, there were 44 Higher Degree Research (HDR) students including nine commencing

students. A number of highly prestigious awards were available to graduates students

on a competitive basis. The recipients of these awards were:

- SEPT – GRIP – Luke Valenza and Jianrong Qiu
- APA/MGS – Revathi Krishna
- APA – Nimmi Candappa, Tharanga Fernando
- APA and RACV – Nebojsa Tomasevic
- John Lane Memorial Scholarship – Hayley McDonald

Congratulations to Dr Shannon Gray, Dr Karen Stephan and Dr Gemma Reid who all graduated in 2016 and to Khic-Houy Prang and Jonny Kuo who submitted their thesis this year.

Dr Gemma Reid received the prestigious Mollie Holman award of excellence for her PhD Thesis entitled “Extension and application of Cognitive work analysis to improve safety at pedestrian level crossings”.

A number of our HDR students attended national and international conferences to present research papers. Six students had their research published in peer-reviewed journals in 2016.

Amanda Warmerdam won the award for best paper by a student at the Frist Symposium on Safety Culture (Monash Business School/ISCRR).

There were ten successful milestone presentations in 2016 (six Confirmations of Candidature, one Mid Candidature Review and three Pre Submission Seminars). MUARC also hosted the second week-long HDR writing workshop during the year. Included in the program was a short course on an Introduction to Research Methods, a half-day seminar by Mind Your Way titled ‘Nailing Grants’, talks from MGE, MPA, the Library and several six-month review presentations by students.

It was a successful year for the MUARC Vacation Student Scholarship Program. We had five summer and six winter scholars working on a variety of road safety and injury prevention research projects. We continue to attract high-calibre candidates to the program and the feedback from staff researchers has been positive. We look forward to growing the program over coming years.





Ms Belinda Clark PhD Candidate

Ms Jianrong Qiu PhD Candidate

Ms Nimmi Candappa PhD Candidate

Ms Revathi Krishna PhD Candidate

Ms Samantha Bailey Administration

Ms Raphaella Schnittker PhD Candidate

Mr Nebojsa Tomasevic PhD Candidate

Ms Hayley McDonald PhD Candidate

Mr Brendan Lawrence PhD Candidate

Ms Tharanga (Tara) Fernando PhD Candidate

Associate Professor Jennie Oxley

Associate Director, Graduate Research

“As a MUARC student, I feel at home in our office. We have so many creative activities like Pi Day, Christmas in July and so on, which lit up our days especially during the cold winter. One thing special about being an MUARC student is that... we get an opportunity to introduce MUARC to people.”

JIANRONG QIU - PHD STUDENT, ‘EXPLORING THE ROAD SAFETY IMPACTS OF BUS SAFETY INSPECTIONS’

“The PhD has afforded me the time and space to explore new concepts, and develop technical skills in an environment unique to higher degree research.”

BRENDAN LAWRENCE - PHD STUDENT, ‘URBAN ROAD CONDITIONS ASSOCIATED WITH THE OCCURRENCE OF CYCLING-RELATED INJURY’

“MUARC is a great place to be a PhD student. The centre organises a range of activities for students to build and develop their skills, including research methods, writing and public speaking workshops. Students are also able to be fully involved in other MUARC activities, including social gatherings, making us really feel part of the centre in which we study.”

HAYLEY MCDONALD - PHD STUDENT, ‘THE CONTRIBUTION OF DRUGS AND ALCOHOL IN SERIOUS INJURY CRASHES’

“No more tunnel vision – MUARC PhD Program is helping me to look beyond.”

“Great professional development courses.”

TARA FERNANDO - PHD STUDENT, ‘THE INJURY COMORBIDITY INDEX STUDY’

“There are two standout features about MUARC for me. One feature of MUARC is that so much of the research is imbedded in practical applications. The other is that people who work here are very generous with their expertise and time.”

FIONA ROBERTS - PHD STUDENT, ‘INVESTIGATION INTO MEASURING DISASTER RESILIENCE RECOVERY’

“MUARC makes it possible for me to collaborate with experts from different fields, especially from engineering and psychology. There is still lots of separation between both in the real world, but at MUARC both are combined. I believe system design for humans needs both, and I am glad to be able to do my PhD in a place where this is possible.”

RAPHAELA SCHNITTKER - PHD STUDENT, ‘COGNITIVE SYSTEMS ENGINEERING IN ANAESTHESIA: DEVELOPING A DECISION-MAKING SUPPORT TOOL FOR AIRWAY MANAGEMENT’

REGULATION AND IN-DEPTH CRASH INVESTIGATION UNIT

Led by Associate Professor Michael Fitzharris, the Regulation and In-Depth Crash Investigation (RICI) team is interested in matters relating to road and vehicle safety regulations, such as how decisions are made, formulated and supported through evidence-based science. The team creates and uses comprehensive in-depth crash data, as well as data from hospitals, police and compensation systems to identify safety concerns.

In 2016, RICI examined a diverse range of road safety issues, and worked on numerous projects, within five distinct themes:

- Alcohol and drugs
- Motorcycle
- Spinal Cord Injury
- Driver state sensing
- In-depth investigation of serious injury crashes through the ECIS program

Drug-driving: getting a better understanding of risks and motivations

In the theme of alcohol and drugs, the team continued its research into the effects and consequences of driving while under the influence of drugs, funded under the MUARC Baseline Research Program.

In 2016, researchers undertook a review of the scientific literature to understand crash risk associated with drugs, and people's motivations for driving post-drug use.

In addition, the team:

- Analysed drug offence and hospitalisation data from Victoria Police
- Constructed a state-wide survey on alcohol and other drugs use
- Interviewed and conducted focus groups with clinical providers and users throughout Victoria

Progress continues on major crash study

During the year, ECIS continued and the activities of the team in this program can be seen on page 15.

Improving motorcycle safety

Research into the safety of motorcycles was again a major topic for the team in 2016.

In collaboration with Dr Julie Brown at Neuroscience Research Australia (NeuRA) and Associate Professor Nigel Taylor from the University of Wollongong, laboratory and simulator work continued on examining the thermal effects of motorcycle gear.

MUARC continues to be a participant in the European Union COST (Cooperation in Science and Technology) Action Safe2Wheelers program, a large collaboration bringing together motorcyclist safety academics and industry to address contemporary and future motorcycle safety technologies. As part of the Centre's involvement, members of the RICI team attended meetings in Wurzburg, Germany and were involved in a number of Work Packages, including motorcycle technology, protective clothing and crash statistics.

Led by NeuRA, the research included an assessment of functional performance of motorcycle protective gear. Presentations were given at the International Research Council on the Biomechanics of Impact Europe Conference in Spain and the World Injury Conference in Finland.



Ms Sara Liu Research Fellow

Mr Daniel Machell Data Entry Officer

Ms Hayley McDonald Project Officer

Associate Professor Michael Fitzharris Associate Director

Ms Revathi Krishna Data Entry Officer

Ms Tandy Pok Project Coordinator

Dr Amanda Stephens Research Fellow

Ms Sujanie Peiris Research Assistant



Safer roads and fewer injuries – the world over

The team continued its engagement with South Africa's Road Traffic Infringement Agency and Road Traffic Management Corporation. In 2016, there was a focus on developing short and executive leadership programs and research programs.

Another continuing role was the unit's involvement in the International Spinal Cord Society (ISCoS). RICl chaired the Road Crash Spinal Cord Prevention Committee in 2016 and was involved in IDAPP, the international consortium examining the incidence, care and injury outcomes post-spinal cord injury in low and middle income countries. As part of Associate Professor Michael Fitzharris' membership of the ISCoS Prevention Committee, a presentation on rollovers among all-terrain-vehicles was given at the 'Prevention Symposium' of the Annual ISCoS conference, held in Austria.

New projects

Two new major projects gave RICl the opportunity to partner with Seeing Machines, an Australian company that creates algorithms and hardware allowing machines to interpret the human face and eyes in order to understand their level of fatigue and engagement in distraction activities.

The first project seeks to examine the incidence and timing of fatigue and distraction events experienced by commercial truck drivers in South Africa and Australia. This work was presented at the Australian Road Safety Conference and the 23rd ITS (Intelligent Transport Systems) World Congress held in Melbourne. It was at this conference that this research was a winner of the Distinguished Scientific Papers – Asia Pacific Award (the paper was titled 'Real-time feedback reduces the incidence of fatigue events in heavy vehicle fleets').

The second new major project is a Cooperative Research Centre Project (CRC-P), led by Seeing Machines. This CRC-P, known as the Advanced Safe Truck Concept (ATSC) aims to develop a highly sophisticated driver monitoring system that links driver 'state', such as fatigue, with the external traffic environment. The project is a joint collaboration with Ron Finemore Transport, whose vehicles will be installed with a range of technologies.

MUARC's driving simulator will be used as a test bed for the development of the technology. The end result will be new knowledge that will lead to the development of a prototype system that integrates the performance and health of the driver with what is going on outside the vehicle on the roads.

ROAD SAFETY MANAGEMENT LEADERSHIP PROGRAM

MUARC's Road Safety Management Leadership Program is designed to develop and nurture the next generation of road safety leaders, whose task it will be to achieve improvements in road safety performance over the coming decades. MUARC provides this professional development program to senior managers from national and international road agencies, as well as government and police organisations, and has trained more than 100 participants since its inception in 2012. Participants have travelled from all over Australia and the world to gain an in-depth understanding of road safety management systems.

In 2016, the Program ran at the beginning of May in the Monash Law Chambers in Melbourne's CBD. MUARC hosted senior managers from road safety agencies in the Philippines, South Africa and Cyprus, alongside members of the Victoria and Western Australian Police, the WA Road Safety Commission and the Transport Accident Commission.

The program drew on the expertise of the Monash research team as well as its strong partnerships with leading global road safety experts, the University of Adelaide's Centre for Automotive Research and Australian Road Research Board, and the Melbourne Business School.

Content addressed the road safety challenges faced by leaders across the globe: from low and middle income countries as well as more developed countries. Presenters with extensive international experience in these environments offered formal presentations and interactive case studies, and participants engaged in work and panel discussions conducted over five days.

Among the many topics covered by the program were:

- Safe Roads & Roadsides
- Safe Speeds
- Safe Vehicles
- Deterrence and Enforcement
- Road User Behaviour
- Leadership Challenges in Road Safety Management

For each topic, participants were asked to consider questions such as "What progress is your organisation making in this area?", "What are the best opportunities that exist now, or that you could work towards?", "What do you need in order to take these opportunities?" "What are the biggest barriers to success?", "How can these barriers be overcome?" An important part of the program is to challenge participants to consider not only the science that underpins road safety solutions but also the leadership implications for implementing those strategies.

The event was highly successful and well-attended, such that a second Road Safety Management Leadership Program – the sixth overall – was organised and hosted in November.

"The program was brilliant. It challenges your beliefs and makes you think differently about road safety."

MARIOS STAVROU, DIRECTOR OF THE NGO REACTION, CYPRUS

"It was a real eye opener; it shows us new possibilities and a new approach to road safety. It is important to see what we can take home and to see what may work and what may not work, the different perspectives have inspired a rethink of our own road safety week."

SIPHAMAMDLA GUMBI, SENIOR ROAD SAFETY MANAGER, ROAD ACCIDENT FUND, SOUTH AFRICA

"This has been very valuable for me. It has given me the bigger picture of where my business unit fits within the broader road safety national strategy."

NARELLE WOODS, OIC, BREATH AND DRUG OPERATIONS, WESTERN AUSTRALIA POLICE

TRAFFIC ENGINEERING AND VEHICLE SAFETY (TEVS)

Led by Professor Brian Fildes, the Traffic Engineering and Vehicle Safety (TEVS) Consortium is made up primarily of research engineers with industry and academic experience in civil and mechanical engineering, as well as safe behaviour. The team comprises Dr David Logan, and a number of PhD engineers, namely Nimmi Candappa, Brendan Lawrence, Steve O'Hern, Mohammad Nabil Ibrahim, Inam Ahmad, Nebojsa Tomasevic, Mohammed Aburumman and Jianrong Qiu (Jocelyn).

The group's work focuses on the development and evaluation of safe road infrastructure, vehicle design and maintenance, work place safety and child restraint. Supervisors, including Professor Tim Horberry, Associate Professor Jennie Oxley, Dr Sharon Newnam and Dr Sjaan Koppel are also key observers within the group.

PhD candidate progress

Many of the team's PhD candidates made significant research progress in 2016. Brendan Lawrence and Steve O'Hern, particularly, made numerous significant achievements between them.

Brendan completed all his formal study commitments, including data collection and analysis, and will work towards the completion of his thesis in the middle of 2017. He was invited to attend the International Cycling Safety Conference in Bologna, Italy, where he presented two papers and chaired one session.

Steve worked on research in bicycle safety through simulation and is finalising his studies in the areas of behaviour and infrastructure. Like Brendan, he expects to complete his thesis in the middle of 2017. Steve completed his mid-candidature seminar in August of 2016, attended the Intelligent Transport Systems World Congress in October, and, with Associate Professor Jennie Oxley, co-authored papers for the Association for the Advancement of Automotive Medicine, and Road Safety on Five Continents.

Industry engagement and projects

Once again, the team has also been active with its project work and in collaborating with industry. Dr David Logan undertook road safety strategy modelling for VicRoads and the TAC as part of the Towards ZERO action plan. Towards ZERO is a Victorian Government initiative that aims for zero death and serious injury by acknowledging that, as humans, we all make mistakes. Its objective is to reach the target by creating safer roads, safer speeds, safer vehicles and safer people – road users, pedestrians and vehicle buyers.

The team also:

- Completed Advanced Driver Assistance System evaluations for Austroads, VicRoads and Euro NCAP (New Car Assessment Programme).
- Assisted the TAC on its safety promotion.
- Continued its work on improved minibus design in Abu Dhabi in association with Associate Professor Stuart Newstead from MUARC's Injury Analysis and Data Team.
- Completed a chapter – with the assistance of Associate Professor Oxley – on Fitness to Drive for a European project headed by the Transport Research Laboratory in the UK.
- Led a successful interdisciplinary research grant application for a Monash Infrastructure Seeding grant, for a project looking at the future of private transport in Australia.

Professor Brian Fildes also continued his involvement with Loughborough University in the UK, working as a Visiting Professor.



Ms Julie Suker Administrative Officer

Ms Nimmi Candappa PhD Student

Ms Jianrong Qiu PhD Student

Associate Professor Jennie Oxley Research Fellow

Mr Nebojsa Tomasevic PhD Student

Mr Brendan Lawrence PhD Student

Absent: **Professor Brian Fildes** and **Dr David Logan**

VICTORIAN INJURY SURVEILLANCE RESEARCH UNIT

The Victorian Injury Surveillance Unit (VISU) analyses, interprets and disseminates data on the state's injury deaths, hospital admissions and emergency department presentations. High-quality injury surveillance data are crucial to preventing injuries and promoting safety and VISU's data are used to underpin government injury prevention policies, stimulate research and to develop and evaluate prevention strategies and measures.

VISU provides quarterly reports to the Victorian Department of Health. The unit also releases data and separate reports for professional and community audiences, such as government departments and agencies of all levels, health and injury prevention organisations, media, business and industry, education institutions, as well as research groups.

13th VISU e-bulletin – Victorian injuries

In April 2016, VISU published the 13th e-bulletin in a series that provides an overview of Victoria's injury profile. More than 96,000 injury cases were admitted to Victorian hospitals in 2014/15, and over 314,900 injury cases presented to Victorian Emergency Departments (EDs). The e-bulletin also reported that:

- The age-standardised annual rate of injury admissions increased by 3.30% per year over the 11-year period 2004/05 to 2014/15; during this period the rate of injury ED presentations increased by 1.20% per year.
- Falls were the leading cause of injury among admissions and ED presentations, accounting for 47% of admissions and 38% of ED presentations.
- The home was the most common setting for injury among admissions and ED presentations: 26% of hospital admissions and 40% of ED presentations.

14th VISU e-bulletin – Victorian injury deaths

In August 2016, VISU published the 14th edition, which focused on injury deaths in Victoria between 2011 and 2013. In the three-year period 2011-2013, 6,105 Victorians died as a result of injury. The majority of these deaths were unintentional (69%, n=4,189), 27.0% were intentional (1,525 suicide deaths and 121 homicide deaths) and the remaining 4.4% were classified as undetermined intent (n=270). These were some of the central findings from the report:

- The overall average annual injury death rate was 36.1 per 100,000 population.
- Three causes combined – falls (34.6%), suicide (25.0%) and transport (14.9%) – accounted for three-quarters of injury deaths (74.4%, n=4,545).
- The leading cause of death among children (0-14 years) was drowning; among adolescents and young adults (14-24 years) it was suicide and transport incidents; among adults aged 25-65 years it was suicide and among adults aged 65+ years, falls were the leading cause of injury deaths.

Hazard – Issues in injury and injury prevention

VISU has been publishing Hazard for almost 30 years. The publication provides an analysis of major or emerging issues in the field of injury and injury prevention. Its aim is to raise awareness of the identified injury and to stimulate preventative action.



Ms Voula Stathakis Research Fellow

Ms Tharanga (Tara) Fernando Data Analyst

Dr Janneke Berecki-Gisolf Director

Ms Samantha Bailey Project Administrator

Ms Jane Hayman Data Analyst

Mr Angelo D'Elia Research Assistant

Mr Adrian Laughlin Research Assistant

Issue 81 – Off-road motorcycle injuries in children

The first issue for the year (Hazard 81) looked at off-road motorcycle injuries in children (under the age of 18). In the ten-year period from 2005/6 to 2014/15, there were 2,883 child injury admissions due to off-road motorcycle riding, an average of 288 hospital admissions per year. The publication reported that:

- Over the decade 2003-2012, 11 persons aged under 18 years died from injuries sustained during recreational motorcycle riding in Victoria.
- The vast majority of child off-road motorcycling injury admissions were males (90%).
- The majority of cases involved a non-collision event: the rider fell or was thrown off the motorcycle.
- While the number of children presenting to hospital for treatment following off-road motorcycle related injury in Victoria was lower than those for Australian rules football or bicycling, for example, estimated injury rates per 100,000 participants suggest that off-road motorcycling has a much higher injury risk.

Issue 82 – Work-related injury

The unit also worked on Hazard 82 throughout the latter part of 2016, with the publication released in January 2017. This issue looked at work-related injury and found that there was an average of 5,570 hospital admissions for unintentional work-related injury per year over the ten-year period from 2005/6 to 2014/15. Other crucial findings included:

- The average change in rate was a 1.5% increase per year over the ten-year period. For males as well as females, workers in the age group 20-24 years showed the largest annual change in work-related injury admission rate with increases of 4.0% and 6.4%, respectively.
- Falls accounted for 19.5% of work-related injury admissions; among those aged 55 years and over, falls accounted for 33.4% of injuries.
- Over the three-year period 2010–2012, 146 persons aged 15-74 years died as a result of unintentional work-related injury in Victoria.
- Almost half of the deaths recorded occurred in transport areas (47.9%, n=70).

The Injury Comorbidity Index Study – a PhD project

In 2016, Tharanga Fernando (VISU, MUARC) commenced a PhD project: The Injury Comorbidity Index Study. It is a VISU data linkage project in collaboration with the Department of Health and Human Services. Chronic disease can delay recovery from injury and increase the risk of complications and death. A better understanding of the impact of comorbidity on injury outcomes will help clinicians to estimate injury prognosis and recovery time, and to develop strategies to prevent injury complications among those at risk. Furthermore, this knowledge will help policy makers to anticipate the effect of population ageing on the burden of injury – comorbidity prevalence increases steeply with increasing age.

Staff arrivals and departures

Two new members of staff joined VISU in 2016. Dr Jane Hayman came to the unit as a data analyst and Adrian Laughlin as a research assistant. At the beginning of the year Dr Shannon Gray left VISU to join the Institute for Safety, Compensation and Recovery Research.



STATEMENT OF INCOME AND EXPENDITURE FOR THE YEAR ENDED 31 DECEMBER 2016

	Notes	\$000's	\$000's	\$000's
BALANCE AT 1 JANUARY 2016				4,458
INCOME				
Commonwealth Government Research Block Grants			1,545	
Research				
Australian Research Council		400		
National Health and Medical Research Council		161		
State and Local Government		3,474		
Commonwealth Government		129		
Industry Australia		263		
Industry International		271		
Competitive Non Commonwealth		42		
Co-operative Research Centres		7		
<i>Total Research</i>			4,747	
Commercial			603	
Internal Grants (Monash Research Support/Strategic Initiatives)	1		2,800	
Other (Including Sale of Assets, Student Fees, Transfers, Donations)			455	
Total Income				10,150
EXPENDITURE				
Salaries and Related Expenditure			6,049	
Financial and Administration	2		387	
Student Related			213	
Infrastructure Related			161	
Central Support Services – Overhead Costs	2		2,744	
Other Operating Expenditure			888	
Total Expenditure				10,442
NET BALANCE FOR THE YEAR				(292)
BALANCE AT 31 DECEMBER 2016				4,166

Notes:

1 The University has provided a transfer of funds to cover the Central Support Services - Overhead Costs

2 Includes payments to consultants

The Centre's Statement of Income and Expenditure has been certified to be in accordance with the University's Accounting and Financial Reporting System by the Office of the Senior Vice-President and CFO. Where required as a condition of funding grants, accounts will be audited by independent external auditors. The Centre's accounts have been subjected to Government audit as part of the University's annual accounts for the calendar year 2016.

Footnote: It should be noted that the Centre operates on a calendar year and its revenue and expenditure are, for the most part, project related and several projects span multiple reporting periods and calendar years. The apparent 'surplus' reflects grant and contract income received in 2016 and prior for expenditure that will be incurred in 2017.



Joel Chibert

Director, Research and Revenue Accounting Services
Office of the Senior Vice-President and CFO



