Seminar Series 2014

Human Factors in Transport Safety

Systems views of railway level crossing design and performance

Railway level crossings represent a significant safety risk for rail operators and road users. This is an important issue in Australia and worldwide with increasing community concern about incidents and accidents. This concern is shared by government authorities and policy makers charged with improving safety. It is becoming apparent that more sophisticated interventions are required to resolve this complex issue.

Upgrading level crossing protection is expensive and therefore, there is a need to make the best of level crossing design and countermeasures. A range of countermeasures are available to rail operators, road and infrastructure authorities, and new and innovative countermeasures are proposed at regular intervals. Yet, there is uncertainty as to the effectiveness of countermeasures and their impact on road user behaviour and system safety has not been assessed systematically.

Level crossing incidents and accidents remain a complex and challenging risk event to control. More research, particularly taking a systemic perspective, is required to understand the risks involved and to inform decisions for effectively managing these. In the past, only a few studies have taken a true systems perspective. This has begun to change with significant research programs supported by the Australian Research Council (ARC) linkage grant "Application of contemporary systems-based methods to reduce trauma at rail level crossings" a four year human factors (HF) research program that addresses level crossing design and safety and the Cooperative Research Centre (CRC) for rail innovation's seven year program of work. These programs have received strong support and continued collaboration from industry.

In this Human Factors in Transport Safety Seminar, Dr Chris Wullems, Professor Mike Lenné, and Associate Professor Paul Salmon present some of the outcomes of their CRC and ARC research programs and discuss the implications for improving safety at rail level crossings.

EVENT DETAILS

Date	**Thursday 6th February 2014**
Time	3.45pm – 6:00pm
Bookings	**BOOKINGS ARE ESSENTIAL**
RSVP	**Thursday 30th January 2014**
Email	elizabeth.grey@transportsafety.vic.gov.au
	Please include "RSVP" in subject line of email
Telephone	(03) 9655 6892
Arrival information	**Report to the concierge desk to collect a security pass**
Venue	Level 5 – Corporate Centre, 121 Exhibition Street Melbourne 3000
Refreshments	Light refreshments will be provided after the event on Level 15.

OUTLINE

Presentation 1 ~ Dr Chris Wullems
Specification and design of safety technologies for complex socio-technical systems

The introduction of safety technologies into complex socio-technical systems requires an integrated and holistic approach to HF and engineering, considering the effects of failures not only within system boundaries, but also at the interfaces with other systems and humans. Level crossing warning devices are examples of such systems where technically safe states within the system boundary can influence road user performance, giving rise to other hazards that degrade safety of the system. Chris will discuss the challenges that have been encountered to date in developing a safety argument in support of low-cost level crossing warning devices. The design and failure modes of level crossing warning devices are known to have a significant influence on road user performance; however, quantifying this effect is one of the ongoing challenges in determining appropriate reliability and availability targets for low-cost level crossing warning devices.

Presentation 2 ~ Professor Mike Lenné
The right human factors data for the right approach

One of the barriers to good design of complex socio-technical systems such as railway level crossings has been the absence of high quality HF data to understand human behaviour and performance in these systems. In this presentation Mike will present some of the human performance data gathered in the first phases of the ARC Linkage Grant. Mike will illustrate how level crossing system design shapes behaviour, and how in-depth data are needed to support "the right approach" to design of not only level crossings but other complex systems.

Presentation 3 ~ Associate Professor Paul Salmon
Systems thinking and rail level crossing safety: new applications and new implications

The concept of 'systems thinking' is now well entrenched within rail safety circles; however, a major barrier to the implementation of this approach within rail is the difficulty in identifying and applying appropriate methodologies that truly reflect systems thinking. In this presentation Paul will describe novel applications of three systems analysis and design methodologies in the rail level crossing context. These are Cognitive Work Analysis (CWA), Accimap (an accident analysis tool) and the Systems-Theoretic Accident Modeling and Processes (STAMP). Paul will describe how each analysis provides new perspectives on rail level crossing safety and new implications for enhancing safety at rail level crossings.

SPEAKERS BIOS

Dr. Chris Wullems, Queensland University of Technology (QUT). Chris is a postdoctoral researcher with the CRC for Rail Innovation. He is currently leading several collaborative research projects in the area of rail safety. These include a national trial and evaluation of risk and legal arguments for the adoption of low-cost level crossing technology, the use of video analytics and data fusion techniques to capture precursor safety data. His research interests lie in safety and security critical technologies, their application to transport safety paradigms and the integration of HF into quantitative risk assessment and safety engineering processes. Prior to this, Chris was the technical director of Qascom S.r.l., Italy, managing research on anti-spoofing techniques for civilian GPS and Galileo receivers. He received his Ph.D. from QUT, where he investigated security of wireless communications and location acquisition systems including GPS for critical applications.

Professor Mike Lenné, Monash University Accident Research Centre. Mike is an Associate Director of the Monash University Accident Research Centre where he leads the HF in Transport team. He is recognised internationally for his research examining factors that shape human performance, and remains instrumental in the development of simulation-based and on-road methods to measure road user behaviour, evidenced through his recent editing of two special issues on these topics in leading journals in the field. Through a balanced portfolio of grant and industry funding his research has had significant impact on transport safety policy and practice, notably in the areas of drug testing, technology use and driver distraction, and intersection design and operation. Through the current ARC-Linkage project he hopes to have a similar impact on policy and practice to improve level crossing safety.

Associate Professor Paul Salmon, University of the Sunshine Coast (USC). Paul is Associate Professor in Human Factors and Director of the USC Accident Research (USCAR) team. Paul holds an Australian National Health and Medical Research Council (NHMRC) post doctoral fellowship in the area of Public Health and has over 12 years experience in applied Human Factors research in a number of domains, including the military, aviation, and road and rail transport. His research interests lie in the application of HF theory and methods to remove threats to public health and safety. Paul has co-authored 10 books, over 90 peer review journal articles, and numerous conference articles and book chapters. Paul has received various accolades for his research, including the 2007 Royal Aeronautical Society Hodgson Prize for best research and best paper and the 2008 UK Ergonomics Society's President's Medal. Paul was also named as one of three finalists in the 2011 Scopus Young Australian Researcher of the Year Award.