

Safety in construction



Professors Helen Lingard, Ron Wakefield and Nick Blismas are members of a multidisciplinary team investigating health and safety in construction. Here, they discuss the importance of maintaining close links with industry and the innovative new avenues for their work



The results of this research have been published in leading peer reviewed journals, including *Construction Management and Economics and Engineering*, *Construction and Architectural Management*, and we won an award for best paper at the recent International Council for Research and Innovation in Building and Construction conference 'Achieving Sustainable Construction Health and Safety'.

Looking back over the course of your careers, what have been your greatest challenges and accomplishments?

The greatest challenges have been in engaging construction industry organisations in our research. The Australian construction industry has a low level of investment in R&D and persuading industry stakeholders of the practical value of research has been difficult. This is exacerbated by typical funding cycles in which there can be a delay of 18 months between the submission of a research grant and the commencement of work. Typically, construction industry stakeholders want results much quicker than that. While this has been (and remains) an obstacle for us, our ability to engage industry has been one of our greatest achievements. Our close relationship with our industry partners distinguishes us from our peers, who tend to have arms-length relationships with the end users of research.

Can you shed light on your medium- to long-term research plans?

The Centre is still in the early stages of development, and its projects, activities and membership continue to grow. This creates opportunities to engage researchers with different backgrounds and skills in construction health and safety research. Particularly exciting new developments include innovative ICT applications such as remote-sensing, mobile computing and building information modelling. We have also developed partnerships with researchers in the fields of gaming, applied optimisation, informatics, smart textiles and nanotechnology. We hope that these relationships will provide opportunities to grow and extend our research programme in exciting new directions.

How did you come to be co-investigators and colleagues? What mutual benefits has your collaboration afforded?

Ron was one of the founding principal investigators of the Center for Innovation in Construction Safety and Health at Virginia Polytechnic Institute and State University (Virginia Tech, USA). He moved to Royal Melbourne Institute of Technology (RMIT) University, Australia, in 2005 and was appointed Head of the School of Property Construction and Project Management. At RMIT, Ron continued his research in construction occupational health and safety.

Helen joined RMIT in 2006. She had been working within industry and was attracted to RMIT because of Ron's strong vision for the school, which involved an emphasis on robust research that is useful to industry. Subsequently, the workgroup was formed with common values, agreement about what constitutes good research, its purpose and desired effects. Nick was already working at RMIT, and he and Helen had previously exchanged ideas for research collaboration, so the fit was perfect.

Our team works so well because each of us brings different skills to projects, and we all have industry experience and are not conventional career academics. As a team, we combine different disciplinary backgrounds: Ron with civil engineering, Nick in construction management and Helen with social science. This multidisciplinary approach enriches our research and enables us to investigate the complex health and safety problems faced by the construction industry from different perspectives.

Can you discuss your Centre for Construction Work Health and Safety Research (CWHSR) at RMIT University?

CWHSR developed from an existing programme of research we undertook together on construction workers' health, safety and wellbeing. It became a Research Centre within the RMIT University Research Structures policy in 2012.

Our research addresses issues of fragmentation in the construction industry's structure and supply chain, and the problems this poses for addressing workers' health and safety in a systematic and integrated way. We are interested in ensuring that health and safety is integrated into every aspect of what goes into a construction project, from the client's procurement decisions to the construction work force. Our track record of successful research project delivery has been recognised by industry, academic peers and RMIT.

You recently published the *Safety in Design Summary Report*. Can you outline the aims behind this research?

The research reported was based on a collaboration between RMIT and the Virginia Tech Centre for Innovation in Construction Safety and Health, USA. Our Model Client Framework prompted US interest in our research team's work in creating research-to-practice outputs for industry, and we were engaged as subcontractors to Virginia Tech in the delivery of a five-year international benchmarking study of construction health and safety.

A safer and healthier working environment

A team from **RMIT University**, Australia, is conducting translational research into the health and safety practices of the construction industry. In their aim to reduce the numbers of workers harmed in employment, they have influenced policy and generated widely impacting guidelines

OCCUPATIONAL HEALTH AND safety (OHS) is critical for protecting all those in employment. A safe and healthy work environment is important for employees, family members, customers and many others. Although an everyday feature in the workplace today, it is actually a relatively recent construct. It was only with the emergence of the labour movement, in response to concerns following the Industrial Revolution, that worker's health and safety became a consideration.

It has particular importance for construction, one of the most hazardous sectors by its very nature. In Australia, construction is the third most dangerous industry, with roughly 50 construction workers killed at work every year in the country since 1998. Therefore, improvements to OHS measures in the industry are vital.

In the Centre for Construction Work Health and Safety Research at the Royal Melbourne Institute of Technology (RMIT) University, Professor Helen Lingard, is working to improve this situation alongside Centre Director, Professor Nick Blismas, and Professor Ron Wakefield. In 2009, Lingard was awarded an Australian Research Council (ARC) Future Fellowship to undertake a programme of research entitled 'Differentiation not Disintegration: Integrating Strategies to Improve Occupational Health and Safety in the Construction Industry' – the only Future Fellowship awarded to a researcher in building. As part of this programme, her team conducts applied research for construction organisations, working closely with industry partners to implement bespoke solutions to OHS challenges.

A MUTUAL PROCESS

The Centre takes what it describes as a 'life cycle' approach to research, considering all facets of OHS and involving a range of stakeholders, including government agencies, design firms, professional bodies and public sector clients – all with a view to improving the work lives of those in the construction sector. Research in the Centre is based on a 'cycle of translation', in which projects are developed in response to the difficulties found by industry (practice to research) and translated into outcomes that can be easily implemented by industry (research to practice). A key aspect of this is investigating variations in OHS among construction projects, and studying the social and organisational drivers to better understand the reasons for variation.

The team is also interested in the problems caused by the technical complexity of construction projects. This aspect of their work is focused on safety in design, the process of anticipating and addressing OHS hazards before construction commences. Today, safety in design is a core element of government policy in many countries. It is a key action area in the Australian Work Health and Safety Strategy and existing legislation requires building designers to consider OHS.

Managing construction risk is by no means a stable process. It is argued that opportunities to reduce OHS risk are highest at the beginning of a project, drastically declining as the project continues. In fact, by the construction stage, the opportunities to reduce OHS risk are massively reduced.

Guiding policy

In 2007, the Royal Melbourne Institute of Technology (RMIT) team developed The Model Client Framework, which establishes a comprehensive process by which Australian Government agencies can embed Occupational Health and Safety into their construction procurement practices. This Framework provides guidelines for government agencies in Australia to embed health and safety into the procurement and management of construction projects.

The Framework has received international attention and was recently cited in the US Government's National Occupational Research Agenda for the construction industry.

INTELLIGENCE

INTEGRATING STRATEGIES TO IMPROVE OCCUPATIONAL HEALTH AND SAFETY IN THE CONSTRUCTION INDUSTRY

OBJECTIVE

To guide the integration of health and safety into decision making across the entire construction project life cycle and ensure that all contributors engage in a collective effort to produce the best possible occupational health and safety (OHS) outcomes for workers.

TEAM MEMBERS

Professor Ron Wakefield; Professor Nick Blismas, RMIT University, Melbourne, Australia

KEY COLLABORATORS

Professor Brian M Kleiner, Myers-Lawson School of Construction, Virginia Tech, USA

Associate Professor Andrew Stranieri, Federation University Australia, Australia

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HELEN LINGARD has been a chief investigator in numerous government and industry-funded research projects and, in 2009, was awarded a prestigious ARC Future Fellowship to deliver a programme of research in the field of construction OHS. She frequently undertakes contract research projects for industry and government and leads a team of researchers in the construction OHS field. In 2013, Lingard developed a Safety Culture Framework and Assessment Tool for the Australian Constructors Association. She is currently undertaking research into construction workers' health funded by the Department of Justice Attorney General (Queensland) and is a chief investigator in two ARC Linkage Project Grants in the areas of Safety in Design and Client Safety Leadership.

It is therefore crucial to act early, but all too often this is not happening. The group's research in this area revealed a multitude of challenges underlying this, many owing to the fragmentation of the industry. "Modern buildings are very complex and require the input of many technical contributors. The interface issues associated with design activities present a significant challenge for an integrated approach to safety in design. Indeed, linear risk management methods are not well suited to the iterative and socially complex design process," the Centre for Construction Work Health and Safety Research (CWHSR) team elucidates. Investigations showed that those with expertise in construction processes are often absent when design decisions are being made.

RECOMMENDING STRUCTURAL CHANGES

Building on these findings, the team was able to publish the *Safety in Design* report, resulting from research undertaken under a sub-contract agreement with Virginia Polytechnic Institute and State University, USA. Using data from 23 case study construction projects from different industry sectors, the team made some compelling findings. They discovered that separating the processes of design and construction limits effective communication between the two. The research supports the notion of the time/safety influence curve, showing that risk control outcomes are better when OHS is considered before construction work begins. Moreover, transferring construction knowledge to those making decisions in the stages before construction (planning and design) minimises risk.

Taken together, this provides robust evidence to suggest that safety in design is most effectively implemented when OHS is considered early in the project life cycle and construction knowledge is used by design decision makers. "We recommend that mechanisms are put in place to ensure knowledge about construction processes, technologies, materials and methods is utilised in the planning and design stages," the team adds. "We also advocate that a broader group of stakeholders is engaged in decision making to ensure their interests are understood and managed." Beyond these individual recommendations, the report also had significant consequences for the group's research plans – they are now developing a set of guidance materials to help industry implement their findings.

BEST PRACTICE GUIDE

Based on the group's history, these guidance materials look set to be extremely successful. In 2007, the RMIT team achieved a world first in construction. Their *Guide to Best*

Practice for Safer Construction was the first to bring together the three major groups of construction stakeholders – clients, designers and constructors – to share the responsibility for the health and safety of workers. The Guide was developed on the back of an in-depth review of Australian and international best practice initiatives and identified key tasks to ensure OHS considerations are properly addressed through all project stages.

Each task was carefully explained, with suggestions of whom should take responsibility for undertaking them. Uniquely, the guidelines were voluntary. Despite this, the document was widely accepted by industry, due to its grounding in robust research and substantial industry input. Indeed, industry involvement is a key tenet of Lingard's research methods. In fact, the team has established an Industry Advisory Group to disseminate its research to the sector, enabling positive OHS impacts.

EXCITING PROSPECTS

The Guide is the most frequently downloaded document within the RMIT research library and has been downloaded in over 70 countries so far. "We believe the Guide is changing the Australian construction industry, which is notoriously slow to adopt new ways of working. We are now working with the Port of Melbourne Corporation, who have adopted the Guide as the foundation of the health and safety management system for a large project to expand the capacity of the Port over the next four to five years," they enthuse.

Lingard has highlighted critical issues in how work is organised and in the prevailing culture of the construction industry, which sees design and construction as separate spheres instead of the continuum it is. Using theories of organisational structure and socio-technical systems, her research has advanced understanding of the issues shaping OHS in the complex environments of construction projects.

Thus, the CWHSR team is integrating a number of strategies to improve health and safety in the construction industry, in Australia and beyond. Their research is collaborative, with several international links; industry-focused, based on constant communication with industrial partners; and translational, created in an ongoing research-practice cycle.

