

Peer-reviewed papers

Building New Partnerships to Improve Road Safety Risk

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Abstract

In 2012 New Zealand's KiwiRAP partners (NZ Automobile Association, NZ Transport Agency, NZ Police, Ministry of Transport, Accident Compensation Corporation), in conjunction with Auckland Transport, Tauranga City, Christchurch City and Dunedin City, took part in a national trial to more fully understand the extent of the crash problem on the urban network. As part of this trial, the successful KiwiRAP crash risk methodology was developed further for use in the analysis of the urban network and entitled Urban KiwiRAP. The Urban KiwiRAP methodology confirms that, generally, approximately 50% of death and serious injury crashes are occurring on around 10% of the urban roading network in each of the trial local authority areas.

To address death and serious injury costs and numbers by putting tools in place to identify the greatest risk of occurrence was a very new approach to injury prevention for the Accident Compensation Corporation (ACC). This organisation generally approached injury prevention from a behaviour change perspective. Changing the lens on the way injury prevention is addressed has opened the doors for new opportunities to partner with Local Authorities in the roading infrastructure space; a new direction for ACC.

This paper discusses the next steps in rolling out this new methodology to a group of Local Authority roading partners and the positive benefits that are expected from both the newly developed partnerships and the use of the Urban KiwiRAP methodology.

Background

Safer Journeys 2010-2020, New Zealand's road safety strategy (*Safer Journeys*), identified that a paradigm shift was required in the way New Zealand (NZ) viewed and approached road safety initiatives. The strategy adopted a new "Safe System" approach - a step change in thinking for road safety professionals (Figure 1).

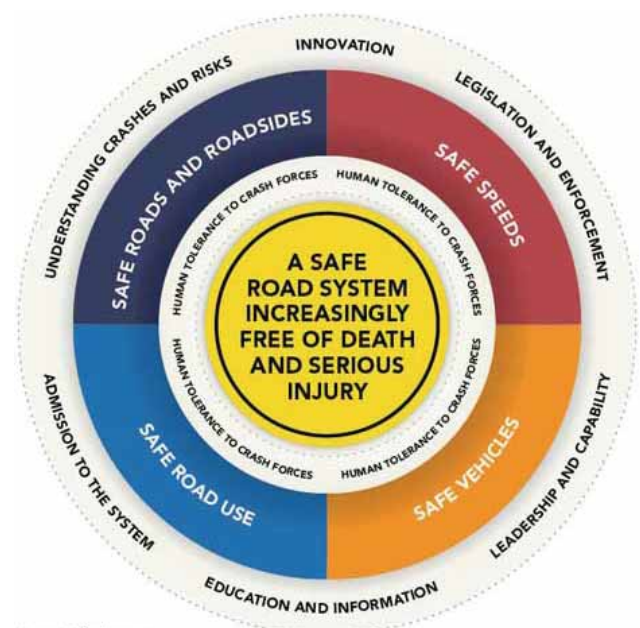


Figure 1. The Safe System (Source: Safer Journeys)

Previous road safety practice was based on education, enforcement and engineering – the “3Es”. Investment and organisational processes to address safety were based around these three work-streams. Safety engineering interventions were generally reactive and based on social costs of crashes, resulting in “after the fact” engineering solutions every few years. Safety improvements on the network were slow and were often completed in isolation to education and enforcement initiatives. The general public saw the social cost ranking for safety projects as “waiting for someone to die” before the funding of improvements could be justified.

The Safe System approach required a different way of looking at the problem of crashes and how to address them. It identified that transport system designers and influencers share responsibility for safety along with the users of the system. It aims for “a safe road system increasingly free of death and serious injury”. Integrating initiatives across all

pillars of the system could be expected to provide a road system with safe roads and roadsides, safe speeds, safe vehicles and safe road use.

The Accident Compensation Corporation's (ACC) Statement of Intent 2015-2019 has injury prevention activity as one of four key areas of focus to achieve the organisational vision and values. To meet return-on-investment (ROI) goals, ACC works with partners to understand areas where injury prevention programmes can produce the greatest impacts on the severity and incidence of injury for New Zealanders. Programmes are generally developed with partners and use social marketing, community activity and learning approaches to change behaviour. Programmes also develop incentive products where appropriate behaviours are supported by levy reductions. Using passive behaviour change models, where infrastructure design moderates or influences driver behaviours or use of the road, is a new approach for ACC and not without challenges.

Introduction of new analytical approaches

Safer Journeys signified a shift in focus from reducing the number of crashes and fatal injuries to minimising the likelihood of high-severity crash outcomes. In order to give effect to *Safer Journeys*, new analytical approaches have been implemented to develop programmes that prioritise sites on their likelihood of future fatal and serious casualty occurrence and risk.

iRAP

The International Road Assessment Programme (iRAP) is a programme of road assessment projects being implemented in more than 70 countries around the world. The programme has a goal to reduce death and serious injury by targeting interventions to areas of the greatest risk.

KiwiRAP

In 2007-08 KiwiRAP, a development of iRAP for NZ conditions, was implemented on high speed rural State Highways. ACC was one of the partners in this project along with NZAA, MOT, NZTA, and Police.

Urban KiwiRAP

In 2012, the Transport Agency, Auckland Transport, Tauranga City, Christchurch City and Dunedin City took part in a pilot project to develop a crash risk methodology for the analysis of the local road network based on the successful KiwiRAP. This model, Urban KiwiRAP, confirmed that, generally, approximately 50% of fatal and serious crashes were occurring on around 10% of the road network in each of the pilot local authority project areas.

The relative rarity of fatal and, to a lesser extent, serious crashes occurring at the same site is evidenced in the analysis of the crash data from the Auckland network in

2013. A study of intersection crashes showed that 79% of fatal and serious crashes occurred at sites with no fatal or serious crashes in the previous five years, and 64% occurred at sites with two or fewer injury crashes in the same period (Brodie et al, 2015). Brodie et al (2015) found that previous fatal and serious crashes were not a strong indicator of the underlying risk of future high-severity crashes for a site.

In the meantime, progress results were released for the State Highway (SH) safety improvements project, a five-year programme of safety works completed between 2007 and 2011 (see Figure 2). The results were compelling, with reductions of 15% and 13% in death and serious injury on rural and urban SH environments respectively, compared to the previous five years, as a result of using KiwiRAP to prioritise sites and their intervention selection. In contrast, the local road network, which was not using the model, experienced reductions of just 1% and 3% respectively.

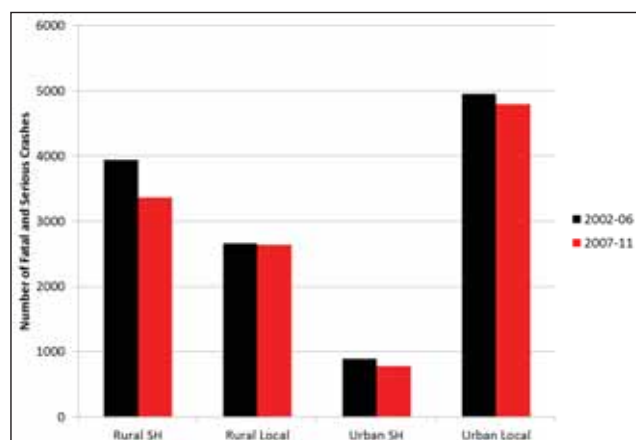


Figure 2. Comparative safety performance of state highways and local roads in urban and rural environments (Source: NZTA)

These positive results encouraged another five “early adopter” Local Authorities to undertake their own risk mapping analysis using Urban KiwiRAP, alongside those in the pilot project, bringing the number of local authorities using the methodology to nine.

Urban KiwiRAP rollout – ACC project rationale

The Urban KiwiRAP pilot project had demonstrated that, similar to KiwiRAP on rural state highways, the urban model would identify the 10% of the urban network where 50% of death and serious injury crashes were more likely to occur. For ACC, the opportunity to partner with local authorities and assist them by providing the information they needed to target their safety spend to this identified risk, had the potential to assist ACC with its own goal of reducing claims costs resulting from road crashes.

Four local authorities implemented Urban KiwiRAP on their networks as part of the pilot project; a total of approximately 12,500 kilometres of road. A further five local authorities have since completed risk maps (but

not star rating) on approximately 10,000 kilometres of road. There are a total of 73 local authorities across NZ covering approximately 85,000 kilometres in length. Of the remaining 62 Local Authorities, a further 13, covering 10,000 kilometres of road network, were identified as generating higher costs for ACC (see Figure 3) (top group of local authority/clusters).

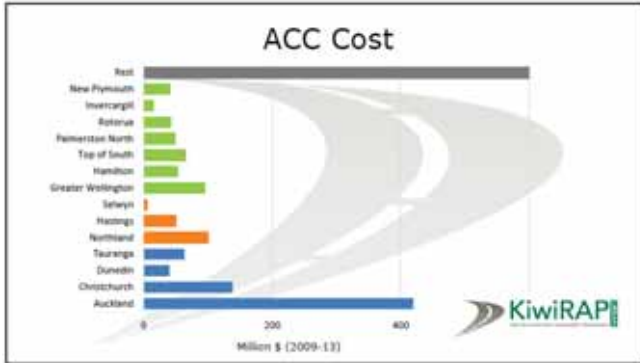


Figure 3. Cost of claims to ACC by local authority/cluster

While ACC has participated in general road safety education projects alongside NZTA, Police and local authorities for many years, ACC has not worked with local authorities in the past on infrastructure projects, despite the vast length of road in the local networks.

Despite interest in the trial project, most local authorities did not have the financial resources to take part in the Urban KiwiRAP programme. It was also assessed that not all local authorities would have enough crashes and traffic volumes on their networks to ensure the validity of this analysis and so the methodology would only be relevant to a proportion of those remaining.

Taking this into account, ACC’s Urban KiwiRAP rollout project proposed extending the reach of the existing work to this next highest risk group of local authority clusters (Figure 4) (top group). This would bring the number of local authorities working proactively to treat their risk-

prioritised safety issues to 22 covering approximately 32,500 kilometres of network and ensuring a statistically significant segment of data to evaluate the benefits of the programme.

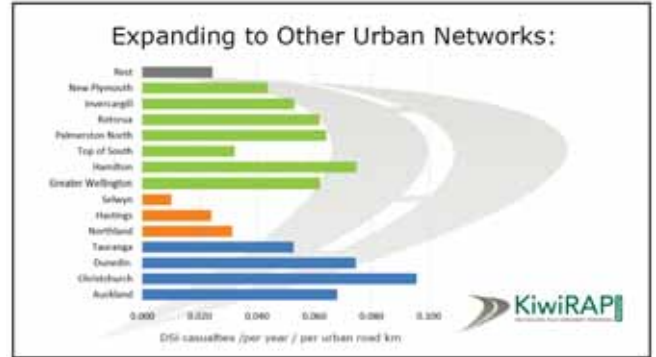


Figure 4. Next highest risk group of local authorities by DSI casualties/year/urban road km

The local authorities were each to be provided with a set of risk maps for personal and collective risk on corridors and intersections, prioritised spread sheets of intersections and corridors for future work programme guidance, personal and collective risk for active road users and motorcycles, and approximately 100-150kms of star ratings per local authority.

ACC proposed offering this information as a partnership project – an offer of information in return for an agreement to make use of the information and allow ACC to monitor the utility and results of using the methodology.

Road injury in the context of the Accident Compensation Scheme

While road injury contributes a small number of claims in comparison to other injury categories, the costs of these are high in the bigger picture of ACC’s no-fault accident compensation scheme.

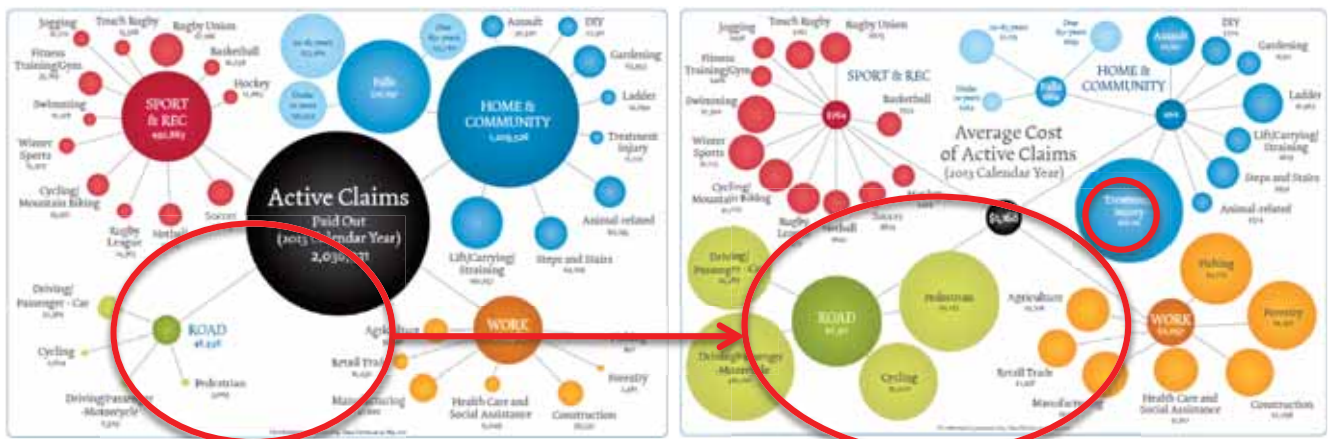


Figure 5. Significance of road claims to ACC – 2013 calendar year, indicative graphical representation of number of claims compared their average costs

Figure 5 shows a graphical representation of the significance of road claims to ACC compared to other injury categories. On the left of the diagram, the number of active claims for the 2013 calendar year is 48,556 out of a total of 2,036,931 – road is by far the lowest contributor of active claims, at 2.4% of the total. (Active claims include those receiving ongoing payments from an injury incurred during previous years.) The cost of road claims to the scheme during 2013 was \$354,976,856 of the total \$2,378,885,865 - 15% of the costs to the scheme. The average cost of each active road claim is \$7,311 compared to the overall scheme average of \$1,168 per claim – just over six times the average injury cost to the scheme; see Figure 5.

The type of trauma sustained as a result of a road-related crash can result in lifelong debilitating injuries, both physical and mental, and high costs to ACC over the lifetime of the person. This serious lifelong trauma also results in ongoing costs to families and society.

Urban KiwiRAP project methodology

ACC (representing the KiwiRAP partnership of Ministry of Transport, NZ Police, NZ Transport Agency, NZ Automobile Association, ACC) undertook to lead and fund a rollout of Urban KiwiRAP to the identified highest risk Local Authorities. Potential partnership criteria included interest in the methodology, demonstration of leadership in the road safety area and acceptance of a partnership sealed with a Memorandum of Understanding to give clarity to the parties.

A partnering model was chosen to best represent a community development injury prevention model where people are assisted to progress at their pace to achieve their goals and, at the same time, those of partner organisations. The premise was that ACC could expect to see claim reductions become evident as partnering Local Authorities used Urban KiwiRAP to manage their road safety improvements.

The first step was to recruit Local Authority partners and an approach was made to the Transportation Managers of the higher risk local authorities identified (Figures 3 and 4) to offer a partnership with ACC. Support for the project was

expected to be around 60%. At this lower response level, ACC anticipated the use of the methodology would still be likely to produce a positive return on investment over time. Instead, support was overwhelming and 100% of the identified local authorities came on board with the project (13 Local Authorities in seven clusters).

Local Authority Transportation Managers and their engineering teams were given a short presentation about the project and how the outputs (Figure 6) could be used to their benefit. They agreed to use the Urban KiwiRAP information to assist with their forward work programme prioritisation. Risk maps and analysis would be updated as the yearly crash data became available, so the Local Authority could monitor the progress of the risk on their network.

The Urban KiwiRAP project provides each local authority with risk analysis for their networks in the following categories: collective and personal risk maps for corridors, intersections, and motorcycles; active road user and all-NZ motorcycle heat-maps; and a publicly viewable “averaged” layer for corridors. Additional heat maps for a variety of crash related behaviours can also be generated and are useful for assessing clusters of risk for pedestrians, cyclists, alcohol, speed, wet weather and darkness.

The outputs also provide a listing of all corridor links and intersections, in order of risk, in a spreadsheet format. This provides a basic screening tool for a work programme that can be done on the desktop by experienced safety practitioners.

Use of the personal and collective risk scores provides guidance for the type of infrastructure improvement selection. Figure 7 indicates best-practice safe system treatments as recommended by NZTA’s best-practice guidance in their High Risk Guides series (NZTA website). This figure shows how the measured collective-vs-personal risk output directs a treatment methodology that reflects the risk. The highest cost items are in the “safe system transformation” section and these are focussed on corridors or intersections with both med-high/high risks for both personal and collective risks. The majority of investment should be targeted at sites of higher collective risk.



Figure 6. Urban KiwiRAP risk map outputs

Collective risk relates to the number of fatal and serious crashes occurring on a stretch of road (crash density); and personal risk is the likelihood a driver will be involved in a fatal or serious crash on a stretch of road. Collective risk is the most interesting to funding agencies whereas personal risk is of more interest to the public as it shows the risk to the individual road user.

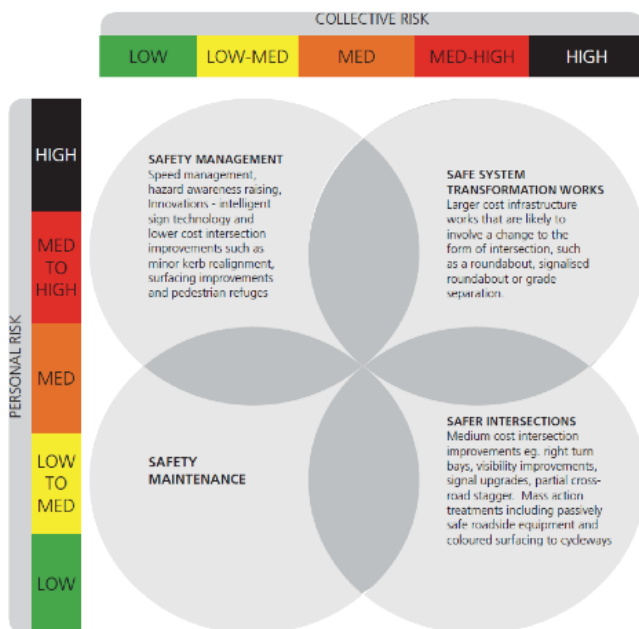


Figure 7. Infrastructure treatments to risk

The personal risk variable is of most interest for ACC. In these areas, where traffic volumes are low, spend on roading improvements can be difficult to justify, but from a claims perspective areas with high personal risk may be where the greater costs to ACC are occurring.

Risk outputs from this project could potentially indicate lower cost safety management and safer intersection interventions, with safety maintenance being an increased focus for network operating or maintenance contracts. Where sites have higher personal risk but low collective risk, treatment methodologies would reflect a focus on low cost treatments such as signage improvements. All local authorities approached were interested in the new methodology because they had seen good safety outcomes on the State Highways and were expecting similar reductions on their own networks.

A refined targeted-to-risk work programme has potential to provide greater opportunities for safety improvement funding. The use of the analysis may have indications for the current funding model for local authority roads if the highest-risk roads are identified but remain unfunded.

Benefits to ACC

The real value in the analysis is that, with around 50% of crashes occurring on 10% of the network, knowledge of what that looks like for a local authority and its community

and politicians should translate to an increased focus on refined targeted-to-risk safety improvements. If more people are presented with clear information about risk on their roading networks, a quite different conversation could be expected at roading decision-maker meetings and community consultation.

Widening the reach of visual tools that assist understanding of Safe System infrastructure treatments also has the potential to create more drive to seek safe system solutions within communities. Taking the road safety conversation to new levels, over time, should influence a reduction in road user injury due to a more normalised safety culture in the community.

The Urban KiwiRAP methodology can be seen as a piece of the strategic jigsaw needed to make the over-arching change in the thinking required for a safe system approach to road safety. It can also be viewed as a fundamental screening tool identifying risk to underpin any sound investment proposal.

For ACC, there is unlikely to be an immediate quantifiable death/serious injury reduction as a direct result of this project. But over the medium term, influencing the way road safety initiatives are prioritised to target the riskiest portions of the road network will result in a reduction in injury and, therefore, claims to ACC. Based on results achieved by the Transport Agency on the State Highways over the five year period, there is potential for ACC to be seeing results by 2020. It is conceivable that ACC could calculate a reduction in claims into the future if infrastructure work programmes were developed using this methodology.

Sector-wide information sharing is critical to getting the paradigm shift needed to ensure a Safe System approach is adopted and the *Safer Journeys* vision of “a safe road system increasingly free of death and serious injury” is delivered. As the road system becomes “increasingly free of death and serious injury”, costs to ACC for road user injury would be expected to decrease and levies reduce for the general public.

Conclusion

Adding Value

For ACC, this project is about partnerships and capability/capacity building in the transport sector. It is an opportunity for ACC to improve its perceived value to key partners Police, NZAA, MOT, NZTA, and to build new partnerships with local government by championing innovative methodologies that will provide good safety outcomes.

Urban KiwiRAP is a leverage vehicle to assist in positioning ACC in the area of trust and confidence, improving the attractiveness of partnership with ACC for road network owners and increasing the influence of ACC in the roading infrastructure space.

This project is also an opportunity for ACC to understand more about passive injury prevention projects related to infrastructure; an untapped area with potential benefits for ACC. Advocating for change in funding models and partnering with local authorities to implement projects that might not ‘cross the line’ in the current investment climate has benefits not just for the local authority and ACC, but also for the wider travelling public – customers of ACC.

ACC has not traditionally worked in the area of assisting with infrastructure improvements. Moving to a position of influence in the planning, prioritisation and funding of infrastructure improvements for safety could be expected to benefit ACC, as a significant shift nationally to prioritised treatment of the highest risk local authority roads will accelerate a reduction in death and serious injury on the road throughout the country.

Next Steps

Of interest are other ways that Urban KiwiRAP is being increasingly used by the pilot project local authorities to assist in transport and district planning. A few of the many examples include:

- A Local Authority updating its Liquor Licensing policies used an alcohol-related crash heat map to identify where crashes were occurring in proximity to licensed premises and assist with its policies relating to alcohol related harm, host responsibility and licensing hours.
- A Local Authority updating its District Plan integrated the risk maps into the traffic impact assessments required for subdivision. Where a subdivision occurred on a high/med risk corridor and had further traffic implications, the subdivider was required to mitigate the traffic issues to medium risk.
- Risk maps have been used for cycleway planning. Examples include shifting a cycle route from a high-risk route to a medium-risk parallel route.
- Local Authority led Road Safety Action Planning processes are referring to Urban KiwiRAP maps and Police are using the information to target enforcement to risk.

- A Local Authority Temporary Traffic Management team is focusing their work site auditing on the higher collective risk routes.
- Risk prioritisation is benefitting business case development for funding of road safety improvements.
- Visual maps are allowing engineering staff to “push back” when community boards or the public advocate for low risk sites to be upgraded.
- Passenger transport route planners are able to identify less “safe” routes for pedestrians and vehicles.
- Network operating contractors and maintenance teams are using the risk maps to target maintenance priorities.

These innovative initiatives were reported from the trial group of four local authorities, with Urban KiwiRAP data being used to assist community decision-making in ways not considered when the analysis was being designed.

Underlying all of these initiatives are the discussions that have arisen from the visual representation of safety risk by Urban KiwiRAP. Cross-organisational teams are talking in a way that was not occurring in the past. Discussions like these have the potential to shift the culture of road safety to a true safe system approach and reduce the risk of serious and fatal injury on the road network.

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