Road Safety Policy & Practice

Not all Roads are Created Equal: Technical Analysis and Engagement Frameworks developed for New Zealand's new Speed Management Guide

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This peer-reviewed paper is an extension of the peer-review paper that was first presented at the 2016 Australasian Road Safety Conference (ARSC2016) held in Canberra, ACT, Australia and that was published in the ARSC2016 Proceedings as a 'Full Paper'. Both papers underwent the full peer-review process by independent experts in the field. The present extended paper is only available in this edition of the JACRS.

Abstract

New Zealand Transport Agency's new Speed Management Guide introduces two innovative frameworks which together are critical to support local authorities in their efforts to put in place positive and lasting speed management measures. The technical framework provides a single assessment method for determining safe and appropriate speeds at a network level. The technical framework aims to better align travelling speeds with road function, design, safety and use, while linking into

wider planning and investment programmes. Implementing speed management interventions is as important as, and much more difficult, than the technical analysis. The new engagement framework builds better conversations on road risk, based on engagement principles that are designed to empower road controlling authorities to improve their engagement, and to encourage communities to participate positively in decision making. This paper presents the application of the technical framework to the Waikato region, including analysis of the assignment and prioritisation of intervention strategies to road sections where speed management interventions have high benefit safety and efficiency opportunities. This paper also details fresh national research focused on understanding community attitudes to speed, used to inform engagement strategies and collateral. This paper will be of interest to all those involved in network management and community engagement, and those interested in prioritising the potential safety benefits of speed management.

Keywords

Speed, engagement, strategy

Introduction

In November 2016, the New Zealand Transport Agency (the Transport Agency) published the final Speed Management Guide, which is an agency responsibility under the second Safer Journeys Action Plan (2013-15). ”Managing speed on the road network is crucial to reducing deaths and serious injuries because the consquences of all crashes are strongly influenced by impact speed. New Zealand’s Safe System goal is to reduce the number of speed related crashes and the severity of all crashes if they do occur. Safer travel speeds that also support economic productivity will help achieve that goal. This leads to three long term objectives:

1. People will increasingly understand what travelling at safe speeds means;
2. Speed limits will better reflect the use, function and safety of the network; and
3. Travel speeds will support both safety and economic productivity.”

Specifically the Action Plan called for development of a speed management programme ”to deliver agreed positions on appropriate speed given the use, function, risk, and level of safety provided by the road, and the communication approach required to achieve this”.

The Speed Management Guide includes two key frameworks, a technical framework, which aims to better align travelling speeds with road function, design, safety and use, while linking into wider planning and investment programmes, and an engagement framework to build better conversations on road risk. The Guide is clear that implementing both frameworks are are critical if local authorities wish to put in place positive and lasting speed management measures.

Speed Management Guide

The stated objectives of the Speed Management Guide are to:

- Ensure a consistent sector-wide approach is adopted to manage speeds so they are appropriate for road function, design, safety, use and the surrounding environment (land use); and
- Help Road Controlling Authorities (RCAs) and other system designers identify and prioritise the parts of their networks where better speed management will contribute most to reducing deaths and serious injuries, while supporting overall economic productivity.
- Support a new conversation on speed by demonstrating that not all roads are equal

The Speed Management Guide helps RCAs plan, invest in and operate their networks to achieve both safety and efficiency, and to effectively engage with their communities to build support for an evidence-based, network-wide strategic approach to achieve these twin outcomes.). A Safe System approach (fundamentally that people make mistakes and the human body is fragile, requiring a system approach addressing safer speed, safer roads and roadsides, safer user behaviour and safer vehicles) is integral to this framework. Applying the technical framework results in the identification of safe and appropriate travel speeds (travel speeds that are appropriate for the road function, design, safety and use) for every road in New Zealand.

Speed Management Technical Framework

The Speed Management technical framework is primarily governed by the One Network Road Classification (ONRC). The ONRC involves categorising roads based on the functions they perform as part of an integrated national network. The classification helps RCAs and the Transport Agency to plan, invest in, maintain and operate the road network in a more strategic, consistent and efficient way throughout the country.

The safe and appropriate speed matrix shown in Figure 1 is based on the ONRC, horizontal alignment, and generalised land use category. The matrix is the fundamental building block upon which the Speed Management technical framework has been developed. The table details travel speed ranges (not speed limits) for different road classifications. The technical framework detailed in the Guide translates these broad travel speed ranges onto the network to identify if speed management is required.

Figure 1. Recommended Safe and Appropriate Speed Ranges for Road Classes (NZTA, 2015)

The Speed Management technical framework sets criteria for a range of safe and appropriate speeds in urban and rural environments. The Speed Management Guide defines safe and appropriate speeds as travel speeds that are appropriate for the road function, design, safety and use.

The key factors in the Speed Management technical framework that are used to derive the safe and appropriate speed for any given section of road are:

- ONRC, which represents the function of the road within the whole network. The ONRC factor provides the overarching basis for aligning travelling speeds with road function, design, safety and use, as it takes traffic volumes, freight networks and place functions into account. The ONRC factor provides the essential network efficiency component into the analysis, ensuring the results are both safe and appropriate for the network function.
- Road safety risk metrics, primarily Personal Risk, representsthe crash exposure for individual road users on a road (Brodie et al; 2015), and is derived from 5 year crash data. Incorporating a safety performance metric of the road into the safe and appropriate speed assessment acknowledges the intrinsic link between travel speeds and safety outcomes. It aligns travel speeds with the safety performance of the road.
- Infrastructure Risk Rating (IRR), which is a road assessment methodology designed to assess road safety risk based on eight design features, operational characteristics and interactions with adjacent land use, independent of crash history. IRR is designed to proactively assess safety risk and is incorporated into the process to assess risk on roads where crash data is an unreliable indicator of safety risk, such as lower volume roads. Full details of the IRR assessment methodology, application and results are presented in 'An Automated Process of Identifying High-Risk Roads for Speed Management Intervention' (Zia et al; 2016.).

The criteria associated with all safe and appropriate speed outcomes for urban roads is shown in Table 1. A road section needs to satisfy the criteria in each of the 'Function / Feature', 'Road Safety Performance' and 'Infrastructure Risk Rating' assessment categories to justify the safe and appropriate speed.

The safe and appropriate speed for each road section is then compared to the posted speed limit. If the safe and appropriate speed and speed limit are the same, the road section is deemed to be 'in alignment' with the Speed Management Framework. Equally, where the safe and appropriate speed and speed limit are different, the road section is deemed to be 'not in alignment'.

Table 1. Proposed Safe and Appropriate Speed Criteria – Urban Roads

Function / Feature	Personal Risk	Infrastructure Risk Rating	Safe and Appropriate Speed (km/h)
• **ONRC is Class 1 or2** • **Identified as a Freight Priority Route in a Network Operating Framework** • **Limited Access Road controls** • **Median Divided**	≤ Low-Medium	Low or Low-Medium	80
• **ONRC is Class 1 or2** • **Non-commercial adjacent land use**	≤ Medium	Low or Low-Medium'	60
• **ONRC is Class 1 or2** • **Non-commercial adjacent land use**	*No road safety metric used in the assessment*	Any IRR	50
• **ONRC is Primary Collector** • **Residential adjacent land use**	≤ Medium High	Low to Medium	50
• **Any ONRC** • **Non-commercial and non-residential adjacent land use**	≤ Medium-High	Low to Medium	50
• **Any ONRC** • **CBD/town centre** • **Residential neighbourhoods**	*No road safety metric used in the assessment*	Low to Medium-High	40
• **Any ONRC** • **CBDs or town centres with high place function and concentration of active road users**	*No road safety metric used in the assessment*	High	30

A key purpose of the comparison between the safe and appropriate speed and the speed limit is as an initial filter to reduce the number of road sections taken through for subsequent assessment, classification and prioritisation. It is not a confirmation that a lower or higher speed limit is justified. The overarching aim of the framework is to achieve regionally and nationally consistent outcomes and enable road controlling authorities to prioritise speed management efforts and available resources to risk.

Intervention Strategies and Prioritisation

Road sections not in alignment with the Speed Management Framework are assessed in further detail to identify speed management intervention strategies and to assign implementation priorities. This secondary assessment process incorporates the following additional factors:

- Travel speeds – both current operating speeds and estimated operating speeds.
- Collective Risk, which is a measure of the overall safety performance of a road.

Analysis of Speed on the Network

For the Waikato Speed Demonstration Project, current operating speeds for high-speed roads were calculated for 9,629 km of roads using an automation of the Austroads Operating Speed Model (Austroads, 2009; Harris et al, 2015). The model is based on maximum desired speeds established from the speed limit, horizontal geometry and vertical terrain, and typical driver acceleration and deceleration behaviours approaching, travelling through and exiting curves. The use of a speed model is necessary where incomplete or unreliable actual speed data exists across a network.

As the Austroads Operating Speed Model is only applicable to high-speed roads, operating speeds for urban road sections needed to be estimated. Based on the analysis of some speed data in Hamilton, the following coarse assumptions were used in the estimation of existing operating speeds:

- All road sections with 'Winding' or alignment or worse, Operating Speed = Speed Limit – 5 km/h
- If ONRC is Class 3 or 4, Operating Speed = Speed Limit
- Otherwise, Operating Speed = Speed Limit + 5 km/h

Understanding the current operating speed for a road section and how this compares with the existing speed limit and calculated safe and appropriate speed, is a critical component of the speed management process for assigning intervention strategies and priorities. Equally important is an awareness of the likely change in operating speed if changes are made to the posted speed limit. For rural parts of the network, the future operating speed is normally calculated by simulating the automated operating speed model with the speed limit set to the safe and appropriate speed. However, given the scale of the Waikato region,

a different method was used to estimate future operating speeds. The method involved the detailed analysis of similar modelling previously completed on the high speed part of the network around the top of New Zealand's South Island. The analysis correlated current operating speeds with future operating speeds for different speed limit and safe and appropriate speed combinations.

The relationship between the change in operating speed as a result of a speed limit change was found to best fit a polynomial function. The following equation was derived for resulting operating speed of corridors with a posted speed limit of 100 km/h and safe and appropriate speed of 80 km/h:

$$\begin{aligned} &-8.824\times10^{!!}\,[\text{illegible}]^{!} \\ &+0.011\,[\text{illegible}]^{!}+5.819 \\ &=0.553\,[\text{illegible}] \end{aligned}$$

The simplified predictive relationship was then applied retrospectively and found to deliver a R2 value of 0.99 for 3,262 km of rural roads assessed in the top of the South Island. This provided sufficient confidence that the simplified predictive approach for future operating speeds could be applied to the Waikato region.

Once all four speed values (existing speed limit, safe and appropriate speed, current operating speed and future operating speed) are known, the applicability of different speed management implementation strategies can then be evaluated and prioritised. All roads not in alignment with the technical framework are evaluated against the following four speed management intervention categories:

- Engineer Up – a road section that satisfies criteria to justify investment to bring the road section up to standard to maintain the existing speed limit or to support a higher speed limit.
- Challenging Conversations – a road section where the calculated safe and appropriate speed is below the existing speed limit and the current operating speed (i.e road users are not understanding the inherent road risk). The criteria for Engineer Up is not satisfied but safety performance justifies intervention (reduce speed limit supported by low cost interventions to manage travel speeds down – involves robust engagement and challenging conversations).
- Self-Explaining – a road section where the current operating speed is comparable to or lower than the calculated safe and appropriate speed, both of which are lower than the existing speed limit (i.e road users are understanding the inherent road risk and are driving accordingly – the speed limit should be reduced to reflect that behaviour).
- Potential Speed Limit Increase – a road section where the calculated safe and appropriate speed is greater than the existing speed limit and criteria is satisfied for a potential speed limit increase.

Attached to each intervention strategy are a series of factors. All road sections are evaluated against each factor under all intervention strategies to determine the intervention strategy that each road section is most closely aligned with. The factors assigned to each intervention strategies are:

- Engineer Up and Challenging Conversations – based on ONRC, Collective Risk, estimated Deaths and Serious injuries (Dsi) saved and estimated DSi saved per km. Road sections with higher order ONRC, moderate to high Collective Risk and moderate to high estimated DSi savings are well-aligned with this intervention strategy.
- Self-Explaining – based on existing operating speed, operating speed change as a result of speed limit change, IRR and estimated DSi per km. Road sections with current operating speeds below the existing speed limit that exhibit little change in operating speed under a lower speed limit, have a moderate to high (poor) IRR and some existing crash history are well-aligned with this intervention strategy.
- Potential Speed Limit Increase – based on ONRC, Collective Risk, IRR and estimated DSi per km. Road sections with higher order ONRC, low to moderate Collective Risk and low to moderate crash history are well-aligned with this intervention strategy.

The 'Speed Increase' priority is only evaluated on those road sections where the calculated safe and appropriate speed is higher than the existing speed limit.

Calculating Deaths and Serious Injuries Savings

The estimation of death and serious injuries (DSi) that can be saved as a result of speed management interventions is based on a form of Nilsson's Power Model. Recent studies undertaken by Elvik (2009) and Cameron et al. (2010) confirm that speed environment is an important moderator of Nilsson's Power Model. Elvik concluded that in general, changes in speed have a smaller effect at low speeds than at high speeds. Furthermore, the analyses show that the exponents proposed by Nilsson based on speed limit changes in Sweden during 1967-1972 overestimate the expected DSi reductions due to various safety improvements in the last 40 years. However, both authors acknowledge that the Power Model remains a valid model of the relationship between speed and road safety if the exponents are adjusted according to speed environment.

Elvik's study presents separate exponents that are considered to be the best estimate to calculate DSi reductions for rural and urban speed environment. The generic form of Power Model equation for calculating future DSi is:

$$[\text{illegible}] = [\text{illegible}]\times\left(\frac{[\text{illegible}]}{[\text{illegible}]}\right)^{!"\#\$\%\&\%'}$$

Where the exponent is set to 2.0 for urban environments (speed limit ≤ 70km/h) and 3.5 for rural environments (speed limit ≥ 80km/h). 'Speed after' values derived from the operating speed modelling have been moderated to ensure that potential DSi savings are not overestimated. This has been achieved by limiting the difference between current operating speed and future operating speed to a maximum rate of change of 5km/h for every 10km/h change in speed limit. This reflects national and international experience where the change in operating speed is rarely found to exceed 5km/h per 10km/h change in speed limit without supporting measures.

Based on experience, the change in operating speed rarely exceeds 5km/h per 10 km/h change in speed limit without supporting measures. This ratio is the upper limit in terms of the operating speed change. The technical analysis showed that, in most cases, the operating speed change per 10 km/h speed limit change is lower than this limit. Based on this experience and using Nilsson's Power Model, this translate to an average DSi reduction of 27% for 100km/h road subject to a proposed 80km/h speed limit, and 9% for a 50km/h road changing to 40km/h.

Road sections where the current operating speed is less than the existing speed limit will attract a lesser percentage reduction in DSi than road sections where the current operating speed is higher. Likewise, road sections where the current operating speed is lower than both the existing speed limit and safe and appropriate speed will generate few DSi savings, as the future operating speed will only reduce by a marginal amount, if at all. Road sections that fall into the latter scenario are most likely to be categorised as 'Self-Explaining' whereas those with a greater difference between current and future operating speeds are more likely to be categorised as 'Challenging Conversations', especially where the road section has an established safety issue. Despite the lack of direct safety benefits that are associated with the 'Self-Explaining' intervention strategy, the classification is important for helping to change the conversation and behaviours with the public around what safe speeds mean. The alignment of speed limits with operating speeds is expected to drive safer travelling speeds on other similar roads and deliver safety benefits across a wider area.

Prioritising High Benefit Opportunities

The highest benefit opportunities for speed management interventions are developed from the intervention strategy evaluation process.

'Speed Management Maps' (SMM) depicting the top 5% and 10% of high benefit opportunities by length have been prepared for every region in New Zealand, and are mapped geospatially on a tool accessble by all RCAs.. The SMM are 50% 'Engineer Up' and 'Challenging Conversations' and 50% 'Self Explaining'. The purpose of the 50/50 split is to ensure there is a twofold focus on both potential for DSi reduction from speed management intervention and improving the public acceptability of speed limit reductions.

If all the speed management interventions prioritised in the top 10 % high benefit opportunities for the network were implemented, it is estimated (using the analysis as detailed above) that approximately 189 deaths and serious injuries will be saved annually on New Zealand roads.

Finally, the process priortises those road sections where the calculated safe and appropriate speed is greater than the existing speed limit based on thresholds set to rank each of these road sections. Road sections that have a 'High' or 'Medium High' Speed Increase priority are included in the SMM as potential speed limit increase segments. These road sections equate to approximately 0.15% of the total road network in terms of length.

A flexible and pragmatic approach

The Transport Agency is acutely aware that implementation of speed management on a regional and national scale to achieve desired safety outcomes whilst supporting economic activity requires extremely careful planning and consideration. To help realise this, the Transport Agency has invested significant time and energy in building confidence and support in the technical analysis by actively working with key stakeholders, such as the Automobile Association, Police and RCAs, in developing the process.

Although the technical analysis provides the platform for speed management decisions, it does not replace sound professional judgement. For the Waikato Speed Demonstration Project, safe and appropriate speeds, intervention strategies and priorities have been reviewed for numerous road sections of interest. Where there is a mismatch between the technical analysis and professional judgement, the technical processes were reviewed, and where necessary modified to reduce the number of anomolous outputs generated from the process. .

A key part of the process used in the Waikato Demonstration process was a local 'sense check', where the high benefit maps were critically reviewed by the road controlling authority engineering staff. Even at this stage, further refinements were able to be achieved to further improve the acceptability of the process outputs.

The engagement and willingness to modify the technical processes has resulted in an upswell of confidence and support for the speed management process in Waikato. This confidence is reflected by the technical outputs of the analytical process now being used by RCAs in Waikato to develop Speed Management Plans for local consultation.

The process refinement developed in the Waikato Speed Demostration Project was then applied in the analysis for all of the regions across New Zealand. Not withstanding this refinement, openess to 'sense-check' the technical outouts continues to be a critical element to ensuring local engagement, confidence and support for the new Speed Management Guide.

Implementation and engagement

Implementation is as important as and much more difficult than the technical analysis. This is especially true of many aspects of transport where public and political interest is high. Speed is a particularly sensitive topic.

An essential element of the Speed Management Guide is a new engagementframework that sets out to build better conversations on road risk, in order to support local authorities in their efforts to put in place positive and lasting speed management measures.

A principles-based approach

The engagement framework is grounded in conversation, holistic communication and social movement theory, and is based on engagement principles that are designed to empower local authorities to improve their engagement, and to encourage communities to participate positively in decision making.

Holistic communication theory (Zaharna et al; 2013) suggests that in order to influence people, it is necessary to allow oneself to be influenced, and this concept is central to the programme's design and implementation, and apparent in the communication and engagement principles that sit at the heart of the framework:

The engagement principles are an integral part of the Speed Management Guide, and accompanied by detailed guidance to help RCAs engage more deeply and meaningfully, and in a more sustained manner, with their communities.

The conversation principles have been designed to show RCAs the power of personal engaegment to contribute to real, long term social change (Bridges; 2010) and have been presented to RCAs through online tools and face to face training modules.

Figure 2 Engagement Principles

Combined, these engagement and conversation principles encourage local authorities to involve as many parties as possible in their community engagement, to engage consistently (not just when they need to consult on changes) and to listen to a wide range of views, and potentially adapt their approach as they go based on that input, consistent with the theory of holistic communication logics.

Audience research

In preparing to implement the new approach to speed management, national market research was commissioned to ensure communities' beliefs, values and behaviours about speed, driving and road safety were understood.

The research had four elements:

1. Stakeholder Interviews (Comprising 20 in-depth interviews): Feedback from local government, transport industry and community groups revealed a range of views. Some believed that attitudes to speed could be changed through more strongly linking speed with risk, while others questioned the focus on speed altogether, believing that driver behaviour was the core issue. Others believed speed reduction needed to be 'better sold' or that it was more relevant to reckless drivers that should be more specifically targeted. Others acknowledged that the conversation needed to extend beyond speed to include road risk and that it needed to be better informed by locals with local knowledge.
2. Community Focus Groups (Comprising 4 group discussions in each of Cambridge and Taupo) : Feedback from the community sample was that speed is a personal choice and one that many felt confident in making. They tended to trust speed limits as being indicators of safe speeds and felt comfortable exceeding these limits when they felt safe to do so. They resisted the idea that slowing down would save lives and tended to blame 'other' drivers for road safety issues.
3. National Survey (Comprising a national on-line survey of n=2,134 using the Research Now on-line research panel. Data was weighted to be representative of age, gender and region): This study revealed differences

Figure 3 Conversation Principles

by both region and the types of roads most frequently driven on. It also revealed four distinct segments that highlighted the range of different attitudes and behaviours in relation to speed, perceptions of road risk and support for changes. Drivers tended to agree that they were safer than others and that speed limits should reflect the risk on the road.

4. Waikato Community Survey (Comprising a telephone survey of n=1,328 residents drawn from random dialing from publically available phone numbers selected based on meshblocks): This research explored local community perceptions and revealed differences in attitudes to both local road safety and awareness of local road safety conversations to support the Waikato Speed Demonstration project.

The National Survey research (on-line survey of n=2,134 using the Research Now New Zealand General Public Research Panel) revealed that:

- People are more likely to blame driver behaviour for crashes on their roads. They blame poor decisions (54%), driver distraction (50%), exceeding the speed limit (49%) and driving too fast for the road (45%).
- People are less likely to blame speed limits as being too high (19%) although they do acknowledge the role higher speeds play in injuries (84%). However they are less sure that slowing driver speed will save lives (55%) and they tend to be divided on speed limit reduction (31% support versus 33% oppose).
- In keeping with the above, people tend to believe the better solutions are to improve warnings to drivers of changing conditions (66%) and to improve road design rather than reduce limits (62%). Where people live plays a key role in attitudes with those living outside small towns more likely to believe that some roads are not safe at their current limit (58% versus 41% nationally) and that it can be difficult to tell what a safe speed is. (42% versus 22%nationally).

The research findings have been invaluable in helping RCAs shape their approach to engagement, and also in adapting and evolving the engagement framework over time.

Attitudinal Segments

Through the research analysis, four segments of drivers were identified. Several attitudinal variables (including perceptions of road safety, speed and a desire to change limits) were run through the latent effects clustering algorithm and segment solutions were chosen in 2 ways:

- A manual run similar to K-means of 3,4,5,6,7 and 8 group solutions
- Automatic selection using the Bayesian Information Criterion (BIC). This chooses the best model / group solution with the smallest BIC from a 1 group to a 10 group solution.)

A four segment model was chosen and displayedsignificant demographic differences (such as by age, gender, driving patterns and by proximity to towns and cities.) as well as attitudinal differences (such as being concerned with road safety, being willing to advocate for safer driving etc).

Figure 4 Four attitudinal segments related to speed management

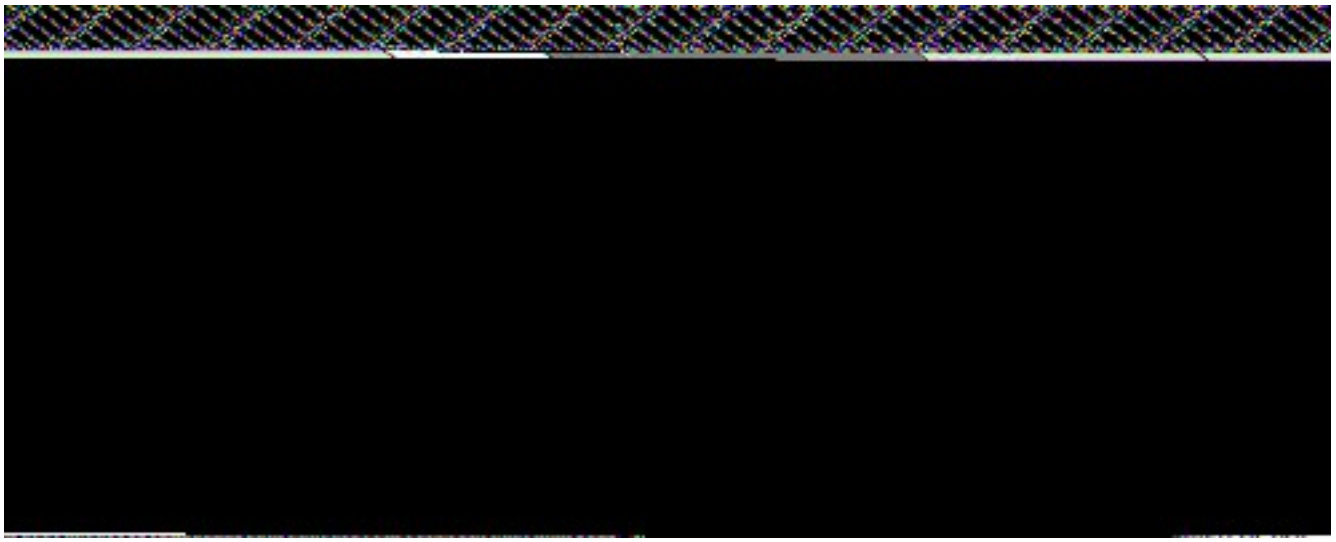

Figure 5 Taking local views into consideration is important to New Zealanders and leads to trust in decision-making

It's important to note here that they are not, however, about age or gender. For example, the 'Fast is Good' does not only represent young male drivers. It's simply that young male drivers are over-represented in this segment.

The segments are much more about the attitudes they represent, than about fitting a certain set of characteristics. The programme uses these segments to help people understand how different people think, and talk, about road safety.

Research Influence on Activities

The segmentation has helped narrow the scope and content of future engagement activity to address speed management's unique challenges. The research showed that more than half of New Zealanders had low engagement in speed issues (comprised of the 'Concerned but disengaged' and 'Care free' segments). The rest of the population was divided into polarised engagement (comprised of the 'Fast is good' and 'Safe speed advocate' segments).

Past research and experience with engagement around road changes gave us confidence to assume that when New Zealanders believe they have an opportunity to engage and that their opinions will be taken into consideration, roading changes are more likely to be supported through the formal consultation process. Figure 5 summarises the output of a bayesian network analysis conducted with NZTA survey data that identifies 'Confidence in the Transport Agencies consideration of the views of residents and landowners' as being an important driver of trust in the organisation.

Given that more than half of the population is dis-engaged from conversations around speed management, it is considered that in order to have a better conversation, first people need to notice that there is a conversation taking place. It has been decided to set the polarised segments aside and focus activity on:

1. Ensuring that people know that a conversation is happening
2. Ensuring that people know that they are invited to participate

It is acknowledged that most people in these segments will not participate. However, the working theory is that as long as they recall being invited to participate and made the conscious choice not to, they will be more likely to accept the final outcome, particularly if reports from those who did participate demonstrate a willingness on the part of the Transport Agency and local government partners to openly accept ideas and feedback.

In order to get participation from at least some within these segments, further focus will be on the "Concerned but disengaged' segment. This segment professes concern so is at least one step closer to engagement. The engagement tools, therefore are centred on making it easy for 'Concerned but disengaged' individuals to participate.

The research helped identify a productive space for engagement, not around speed and speed limits, but around the unique nature of New Zealand roads, as the image below indicates:

The research and accompanying news media audits (which analysed tone and content of media articles over three month periods in two regions of New Zealand) indicated that the current conversation, which tends to be around extreme road safety incidents and blame for other drivers, is not a helpful initiator for engaging in productive discussion about speed management.

Another important insight from both the Stakeholder and General Public Focus Group research is the extremely local nature of people's knowledge of and interest in roads. People know their roads. And their roads are different from other people's roads. And they believe they understand the changes their roads need, and the speeds that should be

posted on their roads better than people who do not live or drive in their region.

Working with and through stakeholders

Implementing the Speed Management Guide, and putting forward the new engagement framework, has involved working closely with stakeholders in the regions, to help them understand the framework and its implications and jointly find solutions to local problems or challenges.

Regions have been encouraged to introduce engagement at a much earlier stage, before any formal consultations. In this way the strategic objectives for an RCA's network have been explained early to gradually build public understanding and support for speed management interventions.

Communication and technical staff in partner organisations have been supported by providing engagement tools and templates, training on conversation theory, and support for developing communication strategies and implementing tactics.

The pace of change has also been important. The speed management framework supports the long term objective that travel speeds should reflect the function, use and safety of the network, but this will not happen overnight. Change should be at a pace that the public can accept and support.

Conclusion

Safe speed is one of the four pillars of the Safe System approach to road safety. The New Zealand Transport Agency's Speed Management Guide has introduced a single technical assessment framework that takes the road function, design, safety and use into account, to determine safe and appropriate speeds at a network level.

Where the safe and appropriate speed is different from the speed limit, a road section is said to be not in alignment with the framework. These road sections are assessed in further detail to identify speed management intervention strategies and to assign implementation priorities. A key aspect of this process is the understanding of current and estimated future operating speeds. The change in operating speed that may be realised from speed limit changes is used to estimate DSi that can be saved as a result of speed management interventions is based on a form of Nilsson's Power Model.

High benefit opportunities for speed management are developed so that 50% of the sections are within the 'Engineer Up' and 'Challenging Conversations' categories, and 50% are within the 'Self Explaining' category. The purpose of the 50/50 split is to ensure there is a twofold focus on both potential for DSi reduction from speed management intervention, and improving the public acceptability of speed limit reductions.

Whilst the technical analysis provides the platform for speed management decisions, implementation is much more difficult and important than the technical analysis. The Transport Agency is acutely aware that implementation of speed management on a regional and national scale to achieve desired safety outcomes whilst supporting economic activity requires extremely careful planning and consideration.

The second essential element of the Speed Management Guide is a new framework for engagement. The engagement framework sets out to build better conversations on road risk, in order to support local authorities in their efforts to put in place positive and lasting speed management measures. Early engagement with key stakeholders and openness to sense testing the outputs of the technical processes to reflect stakeholder views are key themes that

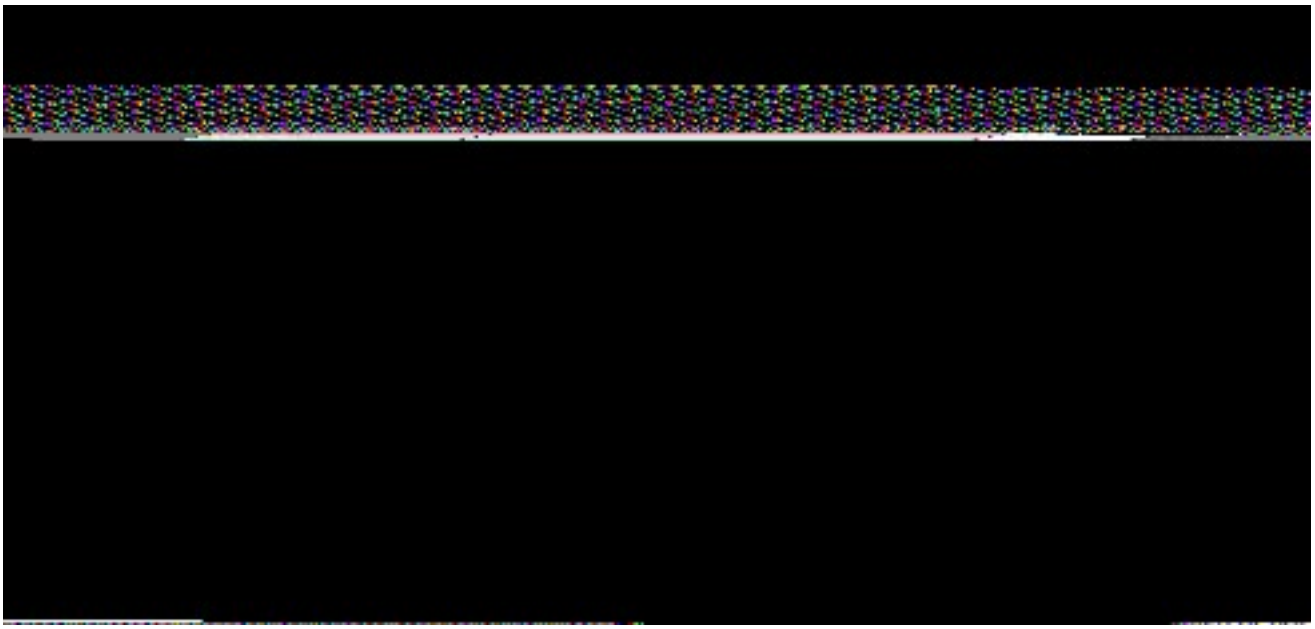

Figure 6 Productive conversations on speed management focus on the road

are contributing to the building of public understanding and support for speed management.

The ultimate success measure for road safety programmes in New Zealand is reduction and deaths and serious injuries. The Speed Management Guide contributes to this measure by aligning travel speed to the use, function and design of New Zealand roads, together with encouraging effective engagement through better conversations on road risk. Using both the technical and the engagement frameworks in the Guide is critical to acheiving positive and lasting speed management measures, and when success is measured by reduction in risk, more options are open for consideration for reducing deaths and serious injuries.

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