Issue 33 September 2016

ISSN 1174-0523 (print) ISSN 1174-0566 (online)

NZTA research

NZ TRANSPORT AGENCY
WAKA KOTAHI

MAKING SMART USE OF REAL-TIME INFORMATION THROUGH CROWDSOURCING

Research has identified positive opportunities for crowdsourced information to be used in the transport sector, and demonstrated the value of crowdsourcing through a real-world road reporting trial.

Crowdsourcing involves sourcing information or other input from a large and undefined group of people (the crowd) about a particular situation or activity.

In relation to transport, crowdsourced information could potentially be used to meet many information needs across the transport sector. Examples are to provide traveller information, support network operations, and manage road safety and transport assets.

In a recent NZ Transport Agency-funded research project, the focus was on investigating how input from crowdsourcing could be used in New Zealand to inform real-time traveller information systems and support the efficiency of the road network.

The project's main purpose was to identify the strategic, legal and policy considerations that would enable road controlling authorities and government agencies to lead or support crowdsourced data initiatives. These considerations include managing privacy, safety, data collection, storage and retrieval issues, using incentives for people to provide input, ensuring data quality, and addressing organisational barriers to new technologies and data collection methods.

The research project was completed by Abley Transportation Consultants, supported by Southern Spatial Solutions.

CROWDSOURCED INFORMATION AND TRANSPORT

In transport applications, crowdsourced data collection generally relies on mobile devices, such as smartphones, being used as sensors to fill gaps in traditional traffic monitoring systems. Gaps might exist because there is no traditional monitoring system in place; or because there is a system, but it is not capable of reporting in real time.

continued on page 2

continued from page 1

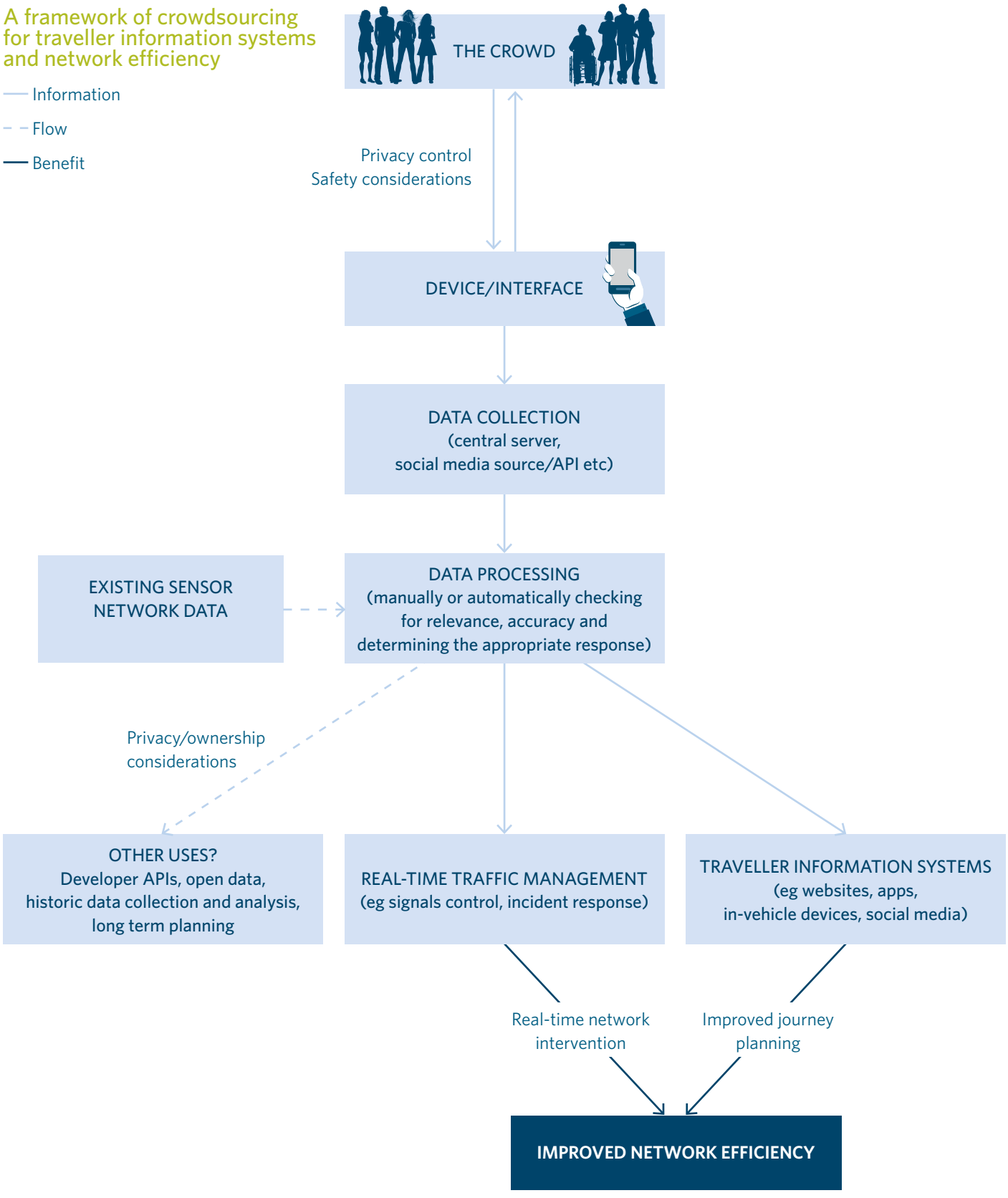
Crowdsourced data can also be used to verify or provide additional context for traditional transport data sources; to bring large groups of people together on the same media platform to address common issues that affect them, for example cyclists and public transit users; and to help develop transport software applications and plan and design transport systems.

Collecting crowdsourced transport information can involve:

- passive data collection – where in-built mobile technologies, such as Global Navigation Satellite Systems and Bluetooth, are used to continuously collect and transmit data about a user's location, speed and direction
- active data collection – where users actively input data about events, incidents or service quality that are affecting the transport network.

It can also involve a mix of both techniques.

A framework of crowdsourcing for traveller information systems and network efficiency



The figure on the previous page shows the relationship between crowdsourcing, and real-time traveller information and network efficiency (the two focus areas of the research). It also shows how crowdsourced data may relate to existing sensor networks and traveller information systems.

Essentially, the crowd, through an appropriate interface, provides information that is stored and processed in a central location. The crowd may also be employed to check and validate other user-submitted information.

The crowdsourced information is supplemented by data from the existing transport monitoring network (if available) and processed for use in traveller information systems. The information can also be used to support real-time interventions in the transportation system, for example in responding to weather events or crashes. The combination of the traveller information system, real-time interventions and data collection all support improved efficiency of the transport network.

INVESTIGATING THE POTENTIAL OF CROWDSOURCED DATA

The research report explores in detail the potential for crowdsourced data to be used in transport contexts. A literature review, and assessments of the strategic transport direction of New Zealand government agencies and the traveller information needs of the New Zealand public, were used to inform engagement with stakeholders. Stakeholders were interviewed about their transport information needs, and their views and concerns about using crowdsourced information to meet these needs.

The identified information needs were then evaluated against a selection of potential crowdsourcing approaches, including social media monitoring, social media mining, developing custom applications, procuring third-party applications or supporting private sector-led development. All of the approaches were shown to have potential value, depending on their audience, application and location.

From this background research, the project team developed and implemented a real-world crowdsourcing trial in the Queenstown–Lakes District. The trial tested a custom web application designed to collect and report on incidents such as crashes, road damage, snow and ice. It also looked at the effectiveness of data collection approaches that used social media monitoring (using Facebook) and social media mining (using Twitter).

The findings from the trial highlighted the value of combining traveller information and crowdsourcing in a single platform, and found that both the web application and the social media monitoring provided useful information that was not picked up from any other source.

However, the social media mining component of the trial yielded no relevant information when specific transport-related keywords were used, leading the team to suggest improvements that could be made if this approach was used in the future.

The research concluded there were many ways that crowdsourced information could be effectively used to improve traveller information and network efficiency. Foremost among these were in relation to public transport occupancy and capacity, congestion, planned event monitoring, and incident and hazard reporting. Other real-time information needs that could be met through crowdsourcing included reporting on dangerous drivers, parking availability, and weather and road conditions.

Any crowdsourcing applications adopted were likely to be of most value when coupled with a traveller information service. Adopting this approach would enable users who submit information to have the gratification of seeing their report publicised, and would enable the information collection method to be promoted through the information service interface.

THE GOVERNMENT'S ROLE

The research also concluded that the Ministry of Transport and the Transport Agency provide a clear mandate for using and sharing transport data. This mandate is encapsulated in their strategic documents and broader data management goals.

What was lacking, however, was clear direction from the government about the role that crowdsourcing information should play in relation to New Zealand's transport system although direction on related matters, such as social media use and open data principles, could help inform crowdsourcing approaches. Despite this lack of specific direction, the research notes there are no actual legislative restrictions on public agencies crowdsourcing information, although current restrictions on using mobile devices in vehicles will affect the use and type of crowdsourcing applications that can be promoted or used.

The research identified the Transport Agency as having a key role in supporting future crowdsourcing initiatives, in particular in relation to establishing 'trust' or quality ratings for crowdsourced information.

'Trust and validation matters should be considered early in any crowdsourcing project, although the exact specifications or policy for this may need to be developed over time due to uncertainty,' the research report concludes.

The role of real-time crowdsourced information and technology in supporting traveller information and network efficiency, NZ Transport Agency research report 593

Available online at **www.nzta.govt.nz/resources/research/reports/593**

HOW PASSENGERS VALUE PUBLIC TRANSPORT ATTRIBUTES AND IMPROVEMENTS

In December 2011, the Transport Agency engaged Douglas Economics and Associated Consultants to conduct research into pricing strategies and service quality improvements for public transport.

The study looked at the trade-off between price and quality for bus and train users in Auckland, Christchurch and Wellington. The study had two main aims.

- To establish willingness-to-pay values for public transport service level and quality attributes (ie how much passengers are willing to pay for particular service attributes or improvements); and to calculate these values both for particular groups of passengers, and as an average for passengers as a whole, to establish the proportion of passengers who are willing to pay more for each improvement.
- To develop a method that could be used to assess the impact that improvements to bus and train services and infrastructure are likely to have on public transport patronage and revenue. This method could also be used to provide incentives for service operators to make improvements, and to identify the most appropriate improvements for use in New Zealand.

This research, conducted between November 2012 and May 2013, involved face-to-face surveys with a total of 12,557 public transport users. Two questionnaires were used to provide different customers insights: a rating survey completed by 7,201 passengers (57% of the total); and a stated preference survey completed by 5,356 passengers (43%).

Neil Douglas of Douglas Economics explains how, as far as the researchers could establish, this use of a 'hybrid' approach, combining the two types of survey questionnaires, was new.

'By using a rating survey with a stated preference survey, we were able to develop a flexible and cost-effective method that can handle different packages of improvements. As well as being able to value new buses and trains, and new facilities for bus stops and station upgrades, the approach can value changes in operational factors, such as cleanliness, graffiti and staff,' says Neil.

The survey covered contracted urban bus and train services, longer-distance rail services (in the Wairarapa, and between Auckland and Pukekohe) and outer Christchurch bus services, as well as the Wellington Airport Flyer, which operates and offers a premium unsubsidised bus service at higher fares. Altogether, services operated by 15 bus companies and two rail operators were surveyed.

In addition to vehicle and stop and station quality, the study covered service frequency, time spent on the bus or train (in-vehicle time) and fares. Including the latter three factors enabled the research team to value changes in vehicle quality and stop and station quality ratings in minutes and dollars, and to estimate differing values of time under different conditions.

KEY FINDINGS

A snapshot of the key findings from the research is presented in the table below. This is just a small selection of a comprehensive suite of results and analysis about the inter-relationship between price and quality, and passengers' willingness to pay for service improvements. The full research report (available online from the Transport Agency's website: see address below) provides a detailed three-volume presentation of the research and its outcomes.

KEY FINDINGS FROM THE RESEARCH PROJECT

Value of in-vehicle time

- The study estimated an average value of in-vehicle time of $9.09 per hour, which was 50% higher than the equivalent figure of $6/hour given in the Transport Agency's Economic evaluation manual. The value of time was found to increase with passengers' income, from $5/hour at 'zero' income to $18.50/hour at $135,000 per year.
- As well as providing a 'basic' value of time, the study was able to quantify the effect of vehicle quality on the value of time. Respondents were willing to pay $5.40 to save an hour travelling on a very poor quality vehicle, and travel instead on a very good one.

Value of service interval

- The survey covered low and high frequency services in the peak, off-peak, evening and weekends. By asking passengers about wait times, as well as the service interval (minutes between departures), the study was able to estimate a mathematical relationship between frequency and waiting time.
- In general, the service interval was valued less than in-vehicle time, with a minute of service interval being equal to 0.7 minutes of in-vehicle time on average. However, this valuation was not constant, varying between being equal to the value of in-vehicle time for high-frequency services, and only around 0.2 for hourly services.

Value of vehicle and stop and station quality

- The rating questionnaire asked respondents to rate their vehicle (bus or train) and the stop or station where they boarded in terms of a list of attributes on a 1-to-9 scale, with 1 being very poor and 9 very good. Two types of model were then estimated on the data. First, the respondent's overall rating was explained in terms of the characteristics of the vehicle or stop (using local authority data) and the profile of the passenger. Second, the variation in the overall ratings was explained in terms of the variation in the individual attribute ratings to attempt to determine the relative importance of each of the attributes. The large sample sizes meant that the parameters in both models could be estimated with high statistical accuracy.
- Passenger ratings of vehicle quality ranged from 65% to around 85% across the 43 bus and train corridors in Auckland, Christchurch and Wellington. The study estimated that passengers' willingness to pay for the 20% rating difference was worth around 32 cents of the $4 average fare (or 8% per trip).
- Compared with an eight-year-old standard bus, passengers were willing to pay a 5.9% higher fare for a new train, a 4.7% higher fare for a new 'premium' bus, 2.5% for a new trolley bus and 1.6% for a new standard bus.
- The profile of passengers was found to influence their vehicle ratings. Females tended to rate their bus or train higher than males by around 1.6%; retired passengers rated 5.5% higher; and young respondents (<18 years old) 3.5% lower.
- As well as providing an overall rating, passengers were asked to rate a set of vehicle attributes. Ride quality, staff and outside appearance were found to be the three most important attributes in terms of their ability to explain the overall vehicle rating. As with the overall ratings, the importance of various attributes was found to vary by passenger characteristics. Females, for example, placed more importance on the inside cleanliness of the vehicle and less on environmental impact when compared with males.

Analysis of bus stops and train stations

- In terms of bus stops and train stations, the average bus stop ratings ranged from 60% to 81% across 35 bus routes, whereas the range in average rail station ratings varied by only 61% to 71% over eight rail routes.
- For bus stops, the overall rating was found to range from a low of 46% when no passenger facilities were provided, to 75% at bus stops where shelter, seating, real-time information and a timetable was provided. Analysis of the relative importance of individual bus-stop attributes showed that cleanliness and absence of graffiti, weather protection and seating were the three most important attributes. Passengers' willingness to pay for facilities was valued at 9% of the fare for providing a shelter, 3% for seating, 3% for real-time information and 2% for a timetable.
- A similar analysis for train stations, showed passengers rated stations that had been upgraded within the previous 10 years at 7.1% higher than stations that had not been upgraded, and stations that had been upgraded within the previous five years at 10.4% higher. The analysis valued a station upgrade to be worth 6% of the average fare within the first five years and 4% in the second five years.

NEXT STEPS

The rating survey gave passengers the opportunity to comment at the end, generating over 1,100 responses.

'These comments, although naturally influenced by the subject of the survey, provide some useful suggestions for the Transport Agency, regional transport authorities and bus and train operators to consider,' says Neil. 'A similar number of respondents also provided their email address, providing scope for further survey work to be carried out, for example to track changes in passengers' attribute ratings for a given service over time.'

Since completing its New Zealand research, Douglas Economics has conducted similar research using the same hybrid survey approach in New South Wales and Victoria in Australia.

'Ultimately, it would be useful to compare and contrast the New Zealand, Sydney and Melbourne values, thereby widening the range of vehicles, stops and stations covered' says Neil. 'There could also be merit in surveying Dunedin, Hamilton and the smaller towns of New Zealand, and of adjusting the survey for use with ferry users. Re-running the survey after major changes have been made to particular bus or rail services would also be interesting. All this information would help build a clearer understanding of what impact price and service quality have on public transport patronage and revenue.'

Pricing strategies for public transport, NZ Transport Agency research report 565

Available online at **www.nzta.govt.nz/resources/research/reports/565**

NATIONAL DEMAND MODEL MADE MORE RESPONSIVE FOR REGIONS

A new model, based on the National Land Transport Demand Model, will enable better long-term regional transport modelling.

Transport Agency-funded research has converted the National Land Transport Demand Model to a Regional Land Transport Demand Model. The regional model will allow practitioners to construct long-term (30-year) regional transport planning scenarios.

The main purpose of the published report on the research is to document and describe technical details of the new regional model for those who will be using it. However, the report also contains many findings that will be of more general interest to people trying to understand transport demand in New Zealand and across New Zealand's regions.

DEVELOPMENT OF THE REGIONAL AND NATIONAL MODELS

The research came about as a result of perceived deficiencies in the National Land Transport Demand Model. Although the national model contained models of regional land transport demand, these were mainly used to take account of the effects of regional variations on aggregate national demand, and were inadequate for undertaking region-specific analyses.

The objective of the research project was to build a more refined model, capable of conducting regional analyses. The two main weaknesses of the National Land Transport Demand Model addressed by the research were its:

- limited region-specific detail on household travel demand and travel demand by mode within regions
- cursory treatment of the difference between where freight transport originates and where it ends up.

Much of the research presented in the published report focuses on improving these aspects of the model. The outcome of the research was four developments to the national model to make it more fit for constructing regional scenarios:

- improved modelling of inter-regional migration flows – based on origin-destination age-specific migration probabilities
- intra-regional density effects, land use and transport demand (congestion) – captured through the relationships between population growth and density, and congestion and costs of travel
- regional mode of travel choices – based on regionalised conditional logit models of discrete choice
- inter-regional freight flows – based on introducing origin–destination matrices for freight flows.

The improved model contains considerable socio-demographic detail in order to connect long-term transport demand to primitive drivers of that demand, such as numbers of people in a region, their age and the region's industrial composition. This is similar to the previous national model.

The new regional model also provides projections of transport demand by region. It can be used to conduct deterministic scenarios, or to measure the uncertainty associated with future transport demand, given observable historical drivers of uncertainty in regional economies and demographics.

The model works on 12 regions, rather than the usual 16; with Gisborne and Hawke's Bay combined to form a single region, and a new upper South Island region encompassing Nelson, Tasman, Marlborough and the West Coast.

REPORT CONCLUSIONS

Despite its predominantly descriptive nature, the report makes some concluding observations on three recurring themes that emerged from the research.

- Discontinuity – analysis of travel demand showed a major structural break associated with the global financial crisis and recession in New Zealand in 2008–2009. The most striking aspect of this structural break is that despite five or more years of economic recovery the effects of that discontinuity are still evident in data on transport demand. This discontinuity was also observed in relation to regional migration.

- Volatility – there are significant amounts of volatility in activity at a regional level in relation to both freight flows and travel behaviour. The report authors did not consider this surprising, given that many regions are very small, which naturally causes volatility. However, the extent of the volatility in freight demand that the research detected was surprising.

- Demographics – age, position in the life-course and population cohort sizes all have profound implications for travel demand. Although this was already generally well known, it was reinforced in the research where age was found to play a particularly important role in explaining changes in travel demand.

From these observations, the report concludes that transport policy should pay careful regard to 'the role of compositional demographic changes in driving human activity and observed aggregate outcomes', stating that observations of travel demand in recent years may be poor 'indicators of future trends'.

Regionalisation of the National Land Transport Demand Model, NZ Transport Agency research report 586

Available online at **www.nzta.govt.nz/resources/research/reports/586**

One of the riders about to go out on site with their bike instrumented as part of the trial.

IMPROVING CYCLIST SAFETY ON RURAL ROADS

Research has examined how to cost effectively improve safety for people who cycle on low-volume New Zealand rural roads.

Low-volume rural roads are defined as roads in rural areas that are not state highways and that have traffic volumes of 3,000 (or less) vehicles each day.

The safety of these roads for cyclists came under investigation after the Transport Agency became concerned there had been no improvement in the numbers of fatal and serious injuries being sustained by cyclists using rural roads, despite the measures in the Safer Journeys strategy, which was launched in 2010.

Research by a team from Opus Research sought to determine the most cost-effective ways to improve safety for cyclists, and understand the relative risks presented to cyclists by the current range of rural New Zealand road layouts.

Initial investigations included a crash analysis for low-volume rural roads and a literature review. This was followed by on-road trials of the most promising options.

The trials showed no significant difference between data for treated and untreated areas of road for three key performance measures. However, it did enable the team to collect unique baseline data for low-volume rural New Zealand roads. It also clarified the measures that would help make future research in this area more effective, from which the team was able to develop a suite of implementation recommendations.

PRELIMINARY INVESTIGATIONS

The crash analysis, completed early on in the project, showed that 354 crashes between cyclists and motorists had been recorded on low-volume rural roads in New Zealand between 2004 and 2013. These crashes resulted in 18 fatalities, 96 severe injuries and 236 minor injuries. The most common crash types were overtaking and rear-end crashes. The crashes carried a large social cost: estimated at over NZ$161 million for the whole period (or $16 million per annum).

A review of the international literature revealed a range of potential solutions to enhance the safety of cyclists on rural roads. The Dutch 2–1 solution emerged as arguably the most successful and was chosen, with some other measures, for trial as part of the research.

In essence, the 2–1 solution involves removing the centreline of the road, and replacing it with 1.5m to 2m-wide cycle edge strips on either side of the road and a single central vehicle lane. A speed limit of 60km/h is set for the area. Threshold treatments to advise motorists they are entering a shared road space include speed limit signs, transverse lines and physical obstacles.

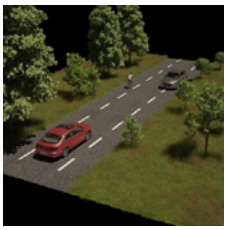
THE TRIALS

The research team selected two road treatments for trial:

- advisory signs for motorists on ideal passing distances
- a 2–1 road layout, adapted for New Zealand, combined with sharrows (shared space arrows) road markings on curves and a 60km/h speed limit.

Trial condition visuals

Advisory distance signage



3D image of 2–1 layout

Sharrow (shared space arrow)

The treatments were assessed in two 'real-world settings' on a low-volume rural road in the Waipa District that were known to be popular with local cyclists.

Driver behaviour in the treated areas was assessed against three key performance measures:

- approach speed (of passing vehicle)
- passing distance (distance between cyclist to vehicle when overtaking)
- bicycle speed.

Metrocounters were used to collect data about the overall speed of all motorists in the two treated areas, while an integrated suite of bicycle-mounted instrumentation was used to collect data about cyclist and driver behaviour. Baseline data was also collected. Eleven cyclists took part, recruited from local cycling clubs and contacts. Vehicle drivers were the usual motorists using the treated routes during the trial times (as the main purpose was to test how driver behaviour might change).

RESULTS AND RECOMMENDATIONS

Research team member Maggie Trotter of Opus Research explains that, although the 2–1 component of the treated areas appeared to be intuitive for most drivers and riders, it had to be discontinued 24 hours into the trial.

'We removed this aspect of the treatment in response to safety concerns and public complaints,' says Maggie. 'What this showed us was the importance of incorporating a robust communications and engagement strategy into any future trials of this, or other new or innovative, road designs.

'We left the sharrows in place, however, so the two treatment options we ended up assessing were the passing distance advisory signs and the sharrows treatment for curves.'

The data collected by the instrumented bikes showed no significant differences between areas treated with advisory signs, areas with sharrow treatments or untreated (baseline) areas for any of the three key performance measures used: vehicle approach speed, passing distance or bicycle speed. The data did reveal, however, that about four in every five drivers across all the areas provided cyclists with the recommended passing distance of 1.5m or more.

The Metrocount data yielded more promising results, indicating that although there was no change in the average free-flowing vehicle speed as a result of the sharrows, there was a 2km/h speed reduction in the advisory sign treatment area.

There was also a large positive speed finding for the 2–1 design area during the day-time, where the design reduced average motorist speeds from about 90km/h to about 62km/h. However, motorists travelling through the area at night were still shown to be travelling at higher than desirable speeds.

Another positive outcome of the research was that the lack of differences between the data collected by the instrumented bikes for the baseline and treatment areas allowed the team to combine the data. The result was a unique set of baseline data for low-volume rural roads in New Zealand. This data is shown in the table below.

PERFORMANCE MEASURE	BASELINE
Average driver approach speed	76.8km/h
Average cyclist speed	23.67km/h
Average driver passing distance	212cm
Driver compliance with 1.5M recommended distance (%)	82%

The project findings also enabled the team to make several recommendations for how future trials could be conducted. This included recommendations for further trials of the 2–1 design to test its application in the New Zealand context; and recommendations about the community consultation, communications and engagement that should accompany these and other trials.

Another recommendation related to the use of advisory distance signs as part of a suite of measures to improve the safety of cyclists on rural roads. 'These signs have been shown to lead to a significant reduction in vehicle speed (a speed reduction that has the potential to benefit the safety of all road users)' the team conclude in their research report.

Other recommendations related to the desirability of developing standardised advisory signs 'to encourage desirable overtaking behaviour when passing cyclists'; and collection of robust baseline data about how drivers and cyclists interact in different settings and road hierarchies, which could then be used to 'better inform and monitor safety intervention outcomes'.

Improving safety for people who cycle on rural roads, NZ Transport Agency research report 589

Available online at **www.nzta.govt.nz/resources/research/reports/589**

FRAMEWORK DEMONSTRATES BENEFITS OF OPERATIONS

Day-to-day operations are a crucial part of managing and operating any transport system. Now there's an improved framework for assessing the economic benefits of these activities.

In the past in New Zealand, economic appraisals for operations activities have not been extensively carried out. New research has established economic evaluation principles and techniques, specifically for use with operations activities, to enable comprehensive appraisals of their benefits to become more established and widespread.

The principles and techniques have been structured into a practical and flexible assessment framework, which was successfully trialled in three case studies.

PUTTING OPERATIONS TO THE FORE

The importance of conducting economic evaluations for 'standard' transport interventions, such as infrastructure and safety improvements, intersection treatments and public transport schemes, is well recognised. Such appraisals tend to follow well-developed and documented procedures and analysis techniques.

Operations activities are also generally recognised as being beneficial. They relate to the day-to-day operation and management of the transport system, and include such activities as network optimisation, ITS system operation, traffic management, planned and unplanned event management, traveller information, and the collection and use of business intelligence.

Compared with other interventions, operations activities generally require significantly lower investment and are likely to return high value-for-money outcomes.

Historically, there has been limited requirement in New Zealand to carry out in-depth economic assessments of operations activities. As a result, the methodologies and approaches for carrying out such appraisals are not well established.

However, the Transport Agency business case approach encourages the identification of a wide range of alternatives and options that will include operations activities, and these need to be considered and evaluated alongside standard transport investment solutions. In addition, parties involved in implementing transport operations (such as the regional transport operations centres) may need to consider the economic impacts, benefits and balances of their day-to-day tasks and processes.

The research report by Traffic Design Group and Ian Wallis and Associates provides guidance based on their research to enable this to happen. The research project's purpose was to identify potential economic approaches and evaluation methodologies for operations activities; compare these with those used for standard transport interventions; and develop a feasible framework for the economic assessment of these activities.

THE NEW APPRAISAL FRAMEWORK

In developing the new framework, the research team took into account the 'agile' environment that the agencies carrying out day-to-day operations activities typically work in. Such environments tend to focus on immediate on-street changes and perceived low-cost approaches, and favour quick-turnaround appraisals, rather than the fuller assessments that are usual for larger-scale standard interventions.

Bevan Wilmshurst of Traffic Design Group says, 'The economic framework we've developed for operations activities is designed to be flexible and practical in its application. The procedures are adaptable to both pre-implementation approaches, including the application of transport models, and post-implementation approaches, using on-road traffic data collection methods.'

The research report fully documents the role of post-implementation (measured data) and pre-implementation (modelling) evaluations in the framework, as these approaches play an important part in assessing the economics of operations activities. Which approach to adopt is a key consideration in applying the framework and making an effective evaluation. The framework is applicable to both approaches and provides some background and considerations in selecting a suitable approach.

The research identified three other key considerations relating to the economic appraisal of operations activities, all of which are taken into account in the framework.

- The definition of the 'do minimum' scenario – definition of the do minimum and development of option costs are key components of operations economic assessments. Defining the do minimum scenario may be as straightforward as reflecting a 'do nothing' situation. However, it may involve careful consideration of the scenario without the intervention (for example, when incident management or traveller information systems are being implemented, and in assessing optimisation strategies) and the specification of a base level of operational upkeep.
- The lifespan of the activity – considering and evaluating the lifespan of the activity is often a critical aspect of an operations economic assessment. The length of the lifespan needs to reflect the type of activity – typically the lifespan and evaluation period for operational activities will be significantly shorter than the standard economic scheme appraisal length. For example, for traffic management activities, incidents and planned events, the lifespan is likely to be the length of the event. For traffic optimisation measures, the lifespan may be the length of time over which it is anticipated that the activity will continue to deliver benefits. For traveller information, lifespan will need to be considered on a case-by-case basis.
- Fully assessing the costs of the operations scheme – assessments must include both external costs (consultancy contracts, equipment etc) and allowance for the operating agency's internal resources (staff time, running costs, software etc).

The report concludes that, in general, operations activities are highly cost-effective transport treatments. The framework will make these benefits more evident.

The framework fits within the Transport Agency's overall assessment framework and notably can be included within business case assessments.

'The economic evaluation framework will provide a practical tool for business case assessments where solutions may, and should often, consider operations treatments to extend the lifespan of existing infrastructure and potentially delay more costly capital expenditure,' the report says.

Demonstrating the benefit of network operations activities, NZ Transport Agency research report 594

Available online at **www.nzta.govt.nz/resources/research/reports/594**

NEW RESEARCH REPORTS

Impact of exposure to dust from unsealed roads

NZ Transport Agency research report 590

Freely available online at www.nzta.govt.nz/resources/research/reports/590

The primary purpose of this research was to improve our understanding of the impacts that dust emissions from unsealed roads have on people and investigate dust mitigation measures. The project's key research objectives were:

1. Characterise the dust and quantify the impacts of dust from unsealed roads on people.
2. Determine the effectiveness and cost of dust mitigation measures.
3. Estimate the costs of the health impacts of dust and estimate the benefits of mitigating the dust.
4. Propose a methodology to support decision making about mitigation options.

A two-month road dust monitoring campaign was undertaken on a section of Mataraua Road, 10km southwest of Kaikohe in the Far North District, during February, March and April 2015.

The monitoring results indicated potential adverse human health impacts might occur due to the dust discharged from untreated unsealed roads. A comparison of the PM10 concentrations monitored at the untreated and treated sites showed the application of a dust suppressant significantly reduced the impact of dust discharged from the road.

Best practice international solutions for mitigating human factor causes of signal passed at danger

NZ Transport Agency research report 595

Freely available online at www.nzta.govt.nz/resources/research/reports/595

This report describes the development and application of a tool to establish a framework for rail participants to explore their current strengths and weaknesses for signal passed at danger (SPAD) risk reduction and to provide the Transport Agency with an overview of the rail industry as a whole.

The project was commissioned by the Transport Agency and undertaken in November 2014 to August 2015 by Interfleet, with input from rail organisations and network access providers, identified as Participant 1, Participant 2 and Participant 3.

The tool is based on concepts derived from the 'Swiss cheese model' of accident causation. It comprises:

- a user guide which provides advice on the self-assessment process
- a Microsoft Excel spreadsheet which provides a tool with 16 dimensions of factors that impact on SPAD risk covering organisational factors, work processes and practices, work environment, and workplace and individual factors.

The tool demonstrated that significant value can be gained by shifting organisational and regulatory focus from simple lag indicator assessment to clearly identifiable improvement opportunities as an indicator of safety system capability and reliability.

OBTAINING TRANSPORT AGENCY RESEARCH REPORTS

All research reports published since 2005 are available free of cost for downloading from the Transport Agency's website www.nzta.govt.nz/planning/programming/research

PDF scans of research reports published prior to 2005 are available by emailing research@nzta.govt.nz

A NOTE FOR READERS

NZTA research newsletter

The *NZTA research* newsletter is published quarterly by the NZ Transport Agency. Its purpose is to profile research funded through the Transport Agency's Research Programme, to act as a forum for passing on national and international information, and to aid collaboration between all those involved. For information about the Transport Agency's Research Programme, see www.nzta.govt.nz/planning/programming/research.html.

Advertisements of forthcoming conferences and workshops, that are within the newsletter's field of interest, may be published free of charge when space permits.

Published articles may be reproduced and reference made to any part of this publication, provided appropriate credit is given.

All general correspondence, queries related to conference notices, and requests for additions or amendments to the mailing list, should be made to research@nzta.govt.nz.

Disclaimer

The views expressed in the *NZTA research* newsletter are the outcome of research and should not be regarded as being the opinion, responsibility or policy of the Transport Agency or of any agency of the New Zealand Government.

Availability of *NZTA research*

The current edition of the *NZTA research* newsletter is available in hard copy or on the Transport Agency website, along with all previous editions of the newsletter, at www.nzta.govt.nz/resources/nzta-research/.

Email alerts of newly published research reports

Email notifications are provided when new issues of the *NZTA research* newsletter are published. Notification is also provided when new Transport Agency research reports are published on the Transport Agency's website at www.nzta.govt.nz/planning/programming/research.html. Please email research@nzta.govt.nz if you would like to receive these email alerts.

Do we have your correct details?

We would like to hear from you at research@nzta.govt.nz if you wish to:

- add or update names, email or address details
- receive the *NZTA research* newsletter in hard copy format
- receive email notification of the publication of the *NZTA research* newsletter and research reports
- alter the number of *NZTA research* newsletter hard copies you receive.

Media contact

For media enquiries – contact Andrew Knackstedt, National Media Manager, on andrew.knackstedt@nzta.govt.nz, ph 04 894 5400.

Other Transport Agency contacts

Patricia McAloon – Manager National Programmes

Nigel Curran – Senior Analyst National Programmes

Karen Johnson – Coordinator National Programmes

For any enquiries, email research@nzta.govt.nz

NZTA research | NZ Transport Agency | Private Bag 6995 | Wellington 6141 | New Zealand

www.nzta.govt.nz

DID YOU KNOW...

That there is a spreadsheet on the Transport Agency website listing all published Transport Agency research reports?

The spreadsheet is searchable by several criteria and can be found at **www.nzta.govt.nz/planning/programming/research.html.**

The spreadsheet has two worksheets; the first worksheet lists research reports with associated key words and the second lists research reports with the report abstracts.

NZ TRANSPORT AGENCY WAKA KOTAHI

New Zealand Government