RESEARCH REPORT 593

The role of real-time crowdsourced information and technology in supporting traveller information and network efficiency

Full report: www.nzta.govt.nz/resources/research/reports/593

NZ TRANSPORT AGENCY WAKA KOTAHI
New Zealand Government

Making smart use of real-time information though 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.

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.

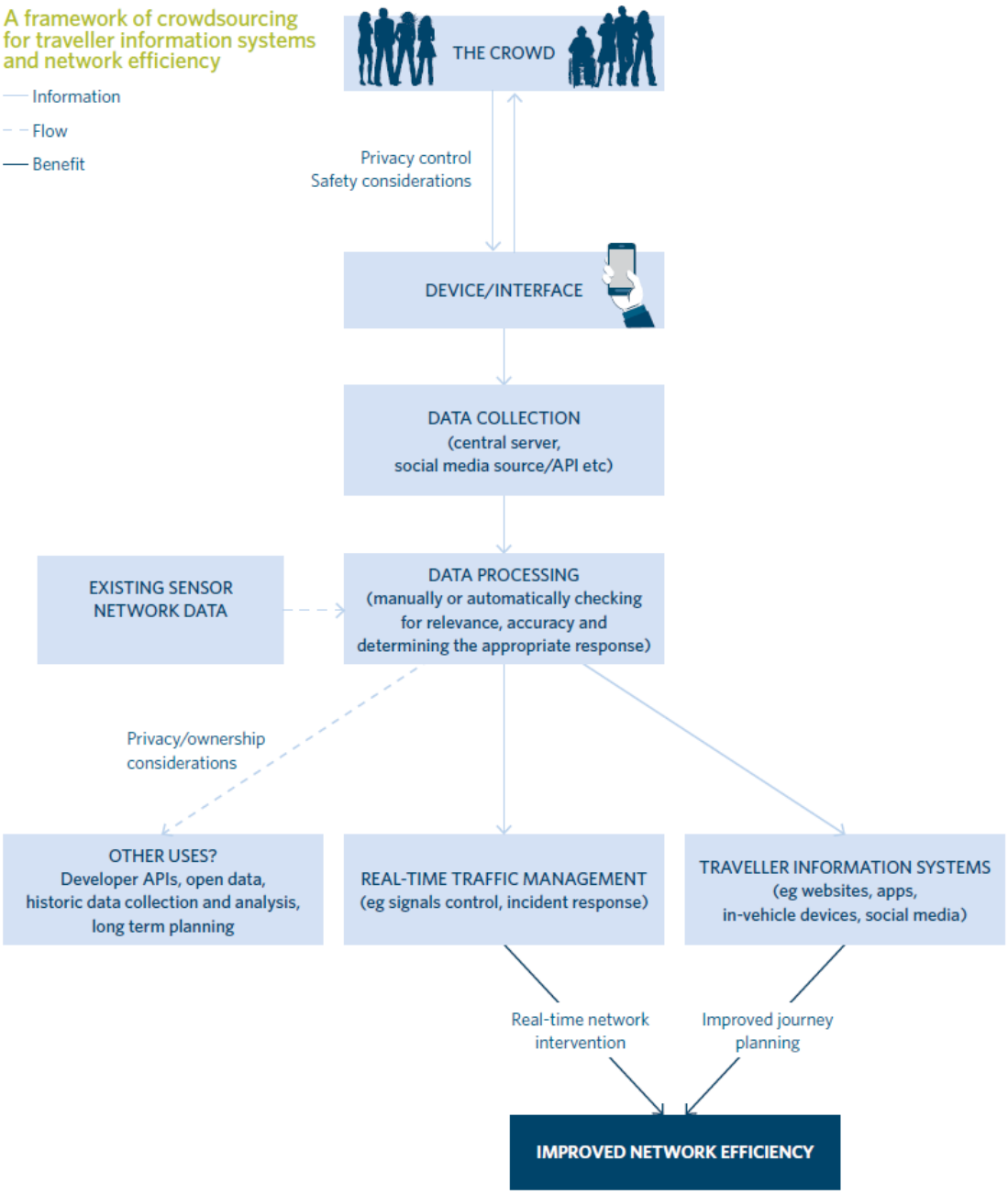
The figure on the following page shows the relationship between crowdsourcing, and real-time traveller information and network efficiency (the two focus areas of the research). It also shows how crowdsourced data may relate to existing sensor networks and traveller information systems.

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.