Rapidly evolving technologies hold promise for urban freight

Opportunities for applying technology to improve the movement of urban freight were explored in recent research, which developed five case studies to describe how technological solutions could be applied in consistently congested areas.

The recent and ongoing growth of technology means there is a wealth of data sources available for analysing road network performance and freight patterns. Emerging technology is also driving the development of intelligent transport systems (ITS), designed to improve transport network operations and traffic management.

The research project by Abley Transportation Consultants and Richard Paling Consulting aimed to develop a better understanding of how available datasets could be used to monitor urban freight flow, and to determine the location and extent of congestion affecting the movement of freight across Auckland's urban roads. The researchers also considered the application of technologies to improve the efficiency of freight movements in these congested areas.

The research included a literature review, stakeholder interviews and international case studies, and later identified five case studies exploring how technological solutions could be used to improve freight movements in known congestion hotspots.

Despite recognising the important role that ITS plays in improving network performance in the city, the research report cautions that technology will not provide a 'silver bullet' to resolve the high degree of network-wide congestion experienced in Auckland.

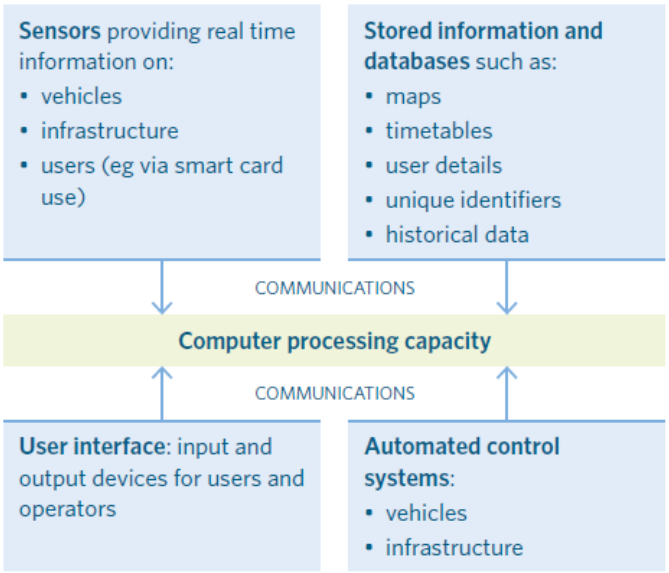
'ITS can improve the delivery of advanced traveller and network information, freight priority and monitoring overall network performance using available datasets, and is an important part of a wider urban freight and indeed general traffic management strategy,' the authors say.

ITS

ITS apply modern computing processing capabilities and technological advances (such as automated control systems, sensors, transportation databases and other input/output devices) to help solve transportation problems, as shown in the figure below.

ITS enable the existing road network to be used more efficiently, and can provide a cost-effective means of monitoring, understanding and managing transportation problems. Wider benefits of ITS include economic, safety and environmental benefits and improvements in people's travel experiences, through reduced congestion, improved road safety and reduced fuel consumption.

Components of a typical intelligent transport system



As part of the project, the research team conducted an extensive review of how ITS have been applied, both nationally and internationally, within the freight sector. In general, it was found ITS are applied as part of wider urban freight management plans, alongside regulatory measures, infrastructure, urban consolidation centres and off-hour deliveries.

The review of international projects also highlighted some of the challenges involved with applying ITS technologies. These included a lack of reliable data, high error rates due to the relative immaturity of ITS hardware, and difficulties with system integration.

The congestion issue

The research team studied the technologies currently being used to monitor traffic congestion in Auckland. Although numerous data sources were identified – including Bluetooth, global navigation satellite systems (GNSS), mobile phones, weigh-in motion, fibre optic, closed circuit television (CCTV), traffic counts and the Sydney Coordinated Adaptive Traffic System (SCATS) – there were no data sources that isolated the movements of urban freight from general traffic.

The team also consulted with industry stakeholders, to gain insight into the current urban freight operating environment and the challenges facing the freight sector. This engagement revealed a high level of frustration among stakeholders with the poor performance of Auckland's current transport infrastructure.

Commercial global positioning system (GPS) datasets were used to produce maps of congestion in the city over half hourly intervals. The maps revealed how widespread congestion was throughout Auckland and that traffic was able to flow relatively freely for only very limited periods. These maps were used to identify congestion hotspots and five of these locations were selected as case studies.

The research report describes these case studies in detail, including how technology could be applied to improve the movement of freight at each locations. The implications of applying these technologies are discussed, including the challenge of prioritising freight without adverse effects on other road users.

The proposed case studies are summarised in the table below.

The research report provides high-level analysis of the costs and benefits for each of the proposed case studies to indicate the likely return on investment.

The authors acknowledged that some technologies are still in their infancy, and potential applications within the freight sector are emerging quickly. When the report was finalised there were already several new initiatives being planned for introduction in Auckland, including virtual freight hubs, that had not been addressed in the research.

The authors state, 'It is important to follow and understand technology developments to capitalise on opportunities for applying technology to continually and progressively improve the network efficiency and the movement of goods.'

Summary of the proposed case studies

Technology used	Overview of how it works	Potential benefits	Case study location
Freight journey predictability tool	• Combines real-time and historic travel time (two-year rolling average) data to provide travel time and travel time reliability estimates • Hosted on line as a road network application programme interface. Delivered via variable messaging sign and web-based applications • Presents a range of likely travel times based on real-time network conditions in addition to average travel time	• Improved visibility of travel time variability • Improved preplanning, schedule and delivery window adherence • Reduced uncertainty of effect of traffic conditions • Fuel savings and reduced driver frustration	MetroPort to SH 1 north and SH 1 south
Freight sector network information tool	• Map-based platform with location specific information relating to accessibility and movement of freight. Including (but not limited to): – road width – loading zones – height restrictions – freight priority ramps – service roads – axle restrictions	• Increased awareness and knowledge sharing • Increased efficiency • Reduced congestion caused by parked or circulating vehicles • Timely and updatable system • Improved safety	Auckland urban area
Intersection freight priority using CCTV video analytics	• The application of video analytics technology to process CCTV footage in real time • Isolate freight vehicles queued in short right turn lanes at signals and extend the green phase to specified movement	• Improve intersection level of service • Improve heavy vehicle throughput • Improve travel times and wait time on right turning vehicles • Increased fuel efficiency	Great South Road and Church Street intersection
Cooperative intelligent transport system freight corridor	• Open communication between trucks and signal infrastructure to provide signal priority • Linking of green phases through advising vehicle of optimum travel speed to pass next signal without stopping	• Improved travel time and journey reliability • Reduced emissions, fuel consumption and noise	Saleyards Rd/Walmsley Rd corridor
Loading zone management tool	• Real-time parking sensors to monitor loading zones and holding areas in large retail complexes • Push out availability of loading zones	• Improved accessibility to loading zones through increased efficiency and turnover • Improved trip planning and delivery efficiency • Reduction in double parked or circulating delivery vehicles	Sylvia Park Shopping Centre