

Helping people, places
and economies thrive

North American
Edition
Issue 19
February 2019

The Review

Spotlight
Integrated
modeling and
policy implications

Infrastructure
The future of transit
infrastructure
investment in
Canada

Movement Matters
Exciting new series
of inspirational
events





Movement Matters

A BURST OF

FRESH

THINKING

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Movement Matters is a series of inspirational thought leadership events exploring new ideas about people, places and economies. Drawing on experience from leaders around the globe, these sessions provide a burst of fresh thinking and a great opportunity for industry networking.

Read more about our international program of events in the U.S., Canada and U.K.

BEYOND TRANSPORT MOBILITY

Toronto, Canada
Spring 2019

With soaring housing prices and a rise in urban population, how can city and regional leaders plan for a livable, equitable and mobile future? Transport investment can act as a catalyst to economic development and the creation of new housing and job centers, however, it can also require significant funding and timelines for delivery. When planning for transport investment, agencies and regions need to carefully understand the wider case for investment from plan to platform to ensure projects are developed and implemented in a mindful way that catalyzes regional development.

This panel will explore the range of views on how transport can be a positive enabler to wider economic benefit, how to measure and justify investment through economic analyses and business cases, and how a transit-centered integrated framework can enhance city planning. The panel will represent a diverse array of regions, cities and transportation systems, each with their unique challenges and varying approaches to addressing the wider case for transport investment.

ALTERNATIVE DELIVERY MODELS

New York, U.S.
Spring 2019

Industry experts will discuss alternative models for financing and delivering infrastructure projects. The panel will consider private sector delivery, public involvement, and public-private partnerships (P3s). The discussion will include strategies on how to best manage risks and impacts of change, increase confidence from design to operations, and ensure optimal return on investment.

RESEARCH & INNOVATION SHOWCASE

London & Leeds, U.K.
Spring 2019

Our decade-long Research & Innovation (R&I) program provides Steer consultants with funds, dedicated time and resources to develop new products and services, generating new ideas and innovation. The result is a growing portfolio of new analytical insights and products. In this year's R&I project showcase, we will demonstrate just some of what has been achieved. Six rapid presentations will show recent R&I work, including 'The implications of a cashless society' and 'The future of Urban Mobility'. Join us to find out about the latest Steer explorations and help shape our future research program.

CHANGING TRAVEL BEHAVIOR

Los Angeles, U.S.
Summer 2019

In Los Angeles, where funding is being poured into transportation infrastructure, is the motto 'build it and they will come' enough? Opportunities to take advantage of best practices such as personalized travel planning (PTP), and innovative transportation demand management (TDM) techniques are being explored, but more can be done. New technologies and mobility options such as scooters, transportation network companies (TNCs), and ebikes are constantly impacting the way we travel.

How can we harness new technologies, transportation investment and use behavioral science to fix the mobility problems of the Los Angeles region?

Join a diverse group of panelists as they discuss mobility trends and how to capture the greatest return on the region's investment dollars.

steer

Welcome

Welcome to the latest edition of *The Review*. This January we celebrated the 10-year anniversary of our first permanent U.S. office. Since then we have grown our operations significantly, with more than 80 staff across six North American offices. Over this period, we have substantially expanded our service offerings and client base.

Our continued growth in North America has coincided with changes in the transportation landscape. These changes require new ideas and coordinated, holistic efforts to create a sustainable system that will enhance our communities, protect our environment, and increase efficient and effective use of infrastructure.

In this issue we discuss some of the recent trends, their potential impacts and innovative ways to address them. Highlights include new tools to perform integrated modeling for public transportation agencies and measure the value of public spaces, research on changes in transit patronage, the future of transit investment in Canada, and transportation pricing tactics and policies.

We also announce a new series of Steer organized Movement Matters events, thought leadership seminars on various topics. I would personally like to invite you all to these seminars, and with your active participation, we are sure to have engaging and interesting discussions.



Masroor Hasan
Head of U.S. Advisory

A Steer publication

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New faces



James Daisa
Associate Director

James joins as Practice Leader for our Los Angeles office. He is a transportation planner and traffic engineer with over 30 years of experience. James brings expertise in complete streets design and has been at the forefront of innovative complete street policies and design manuals. He also has expertise in transit oriented development (TOD), transit station area planning and center design, parking studies, environmental impact reports (EIRs), downtown revitalization and urban infill development.



Iain Conway
Principal Consultant

Iain joins our Los Angeles office as a transportation planner and economist with extensive knowledge in modeling, economic appraisal and development planning. He has delivered modeling and economic appraisal for numerous highway, walk and bike, BRT, LRT and high-speed rail projects.



David Laurens Vallego
Principal Consultant

David joins our team in Los Angeles, transferring from our Bogota office. He brings 10 years of experience in multimodal mobility planning, transportation infrastructure, transit systems structuring projects, territorial planning studies, design and optimization of major developments and the estimation of transportation demand.



Eli Scheker
Principal Consultant

Eli joins our New York office, bringing extensive experience applying statistical techniques to the evaluation of investment decisions and developing customized analyses for project financing purposes. He brings a unique background in public policy, infrastructure advisory and investment management.

Company updates



Carmen Correa Lafuente
Associate

Carmen re-joins Steer as part of the California High Speed Rail (HSR) project team in Sacramento. She will utilize her project management skills and financial experience to help support the advancement of the program. Carmen originally joined Steer's Puerto Rico office in 1998, as the first local hire. There she led the office and managed a varied portfolio of transportation projects.



Pietro Bucci
Principal Consultant

Pietro joins our aviation team, bringing a background in transportation economics and research. He has worked across various aviation projects on sell, buy-side and lenders' advisor in Europe and emerging markets. Pietro has also worked on traffic forecasts, commercial revenues and operating expenditures, and the development of benchmarks for a variety of projects.

Senior Consultants

Ali Goddard transfers to our Vancouver office from the U.K.; Adrian Leung joins our aviation team; Dapo Olajide joins our Toronto office; Alex Depompolo joins our Washington, D.C. office.

Consultants and Assistant Consultants

Isabel Viegas de Lima, Charles Jeabart and Caitlin Delaney join our Boston office; Nikita Benson joins our New York office; and Mary McGuirk joins our Los Angeles office.

Looking to move?

If you are considering your future and are looking for somewhere to make a real difference, Steer has much to offer. Our firm continues to grow in North America and throughout the world. To find out about current opportunities, visit our website: steergroup.com/careers.



Sharon Daly becomes COO

We are delighted to announce the appointment of Sharon Daly as Chief Operating Officer (COO). Sharon has worked at Steer for 18 years, starting in a junior role and working her way up to becoming an Associate and then Division Head for U.K. Planning. In 2016, she was promoted to U.K. Managing Director and now she looks forward to her new role as COO. After six years at the Department for Transport in South Australia, Sharon moved to the U.K. to join Steer. Her career has spanned a range of high-profile secondment positions, including roles at the Strategic Rail Authority, Merseytravel, Transport for London, West of England Combined Authority, Cambridgeshire County Council, and London Underground.

As U.K. Managing Director Sharon has had an opportunity to set a vision for our U.K. business. As COO, Sharon will ensure our operational aspects support our success.

Movement Matters kicks off strong in 2019

We are delighted to announce the relaunch of our Movement Matters thought-leadership event series. With a new refreshed look and feel, the first event took place in early February 2019 in central London, featuring a panel of excellent speakers including the former U.K. Secretary of State for Transport and Chair of the National Infrastructure Commission, Rt Hon. the Lord Adonis. The series will hit North America in spring with a panel in Toronto examining transportation investment as an economic catalyst, followed by events in New York and Los Angeles. For more information and to register to attend visit: steergroup.com/events.

The Steer R&I Program continues

At Steer, we actively invest in developing new ideas and ways of working through our Research and Innovation (R&I) Program. We encourage our staff to think creatively about their work and how we can help our clients maximize opportunities. Recent significant successes for our R&I Program include: widely reported research about the effect of autonomous vehicles (AVs) on urban design, software for recording the movement of pedestrians through spaces such as stations, and research on the value of train numbers on tickets and timetables.

Our R&I Club meets every two weeks, allowing anyone to bring ideas, problems and solutions for debate. To mark our 100th R&I Club meeting we produced a booklet describing 32 of our favorite R&I projects carried out since the Club began. You can download your copy here: steergroup.com/about/research-innovation.

One of the ways we encourage innovative thinking is by holding Hackdays, where teams use their skills and knowledge to find innovative solutions to industry problems. In November of 2018, we held our third Hackday event. Five teams worked intensively on pre-selected topics: the benefits (or otherwise) of free public transit, the effects of a cashless society on transportation, the impact of extreme weather on transportation, how changes to demographics and technology will affect transportation demand, and how Steer can attract a diverse workforce.

At the end of the day each team gave a presentation about their findings to a panel of judges, who had the difficult task of choosing a winner. The team looking at the effects of a cashless society were the Hackday winners, but all five teams delivered excellent work.





Integrated modeling and policy implications

By Stefan Reul

Public transportation agencies operate in an everchanging environment that requires reactive planning processes in the short-term which align with long-term investment and infrastructure strategies.

To support our clients in this challenging environment, Steer has developed a suite of integrated modeling tools which bridges these competing needs. The tools allow for relatively short turnaround times, while also following a rigorous scenario planning approach that can address changes in services, user behavior, competing modes, network conditions or financial constraints. This suite of tools incorporates streamlined interfaces between each modeling component, with a focus on performing high-level analysis of scenarios. The modeling tools provide sufficient detail in its outputs to allow for a well-informed comparison of scenario implications without requiring extensive level of detail and resources of other existing planning and evaluation tools.

Our modeling suite consists of four major components:

- **Service planning:** A high-level service planning tool (ATTune) that facilitates efficient testing of changes to rail and

transit schedules, including resolution of conflicts and an assessment of equipment needs to run the schedules. This tool provides a range of insightful analytical outputs, including stringlines, platform occupancy charts and conflict summaries. We have developed interfaces that allow a streamlined import of General Transit Feed Specification (GTFS) schedule data, as well as outputs that feed directly into the ridership, land-use, and cost modeling processes, thereby ensuring detailed schedule adjustments are directly reflected throughout the analysis.

- **Ridership and land-use modeling:**

An urban/regional dynamic model (UDM/RDM) based on the principles of system dynamics that simulates the dynamic interaction between transportation demand, land-use and socio-demographic indicators, such as population and employment. Unlike traditional demand models, or even activity-based models, the UDM/RDM has the ability to allow for non-constant population, employment and land-use in travel analysis zones and is therefore able to assess the impact these items have on the transportation network. The model interfaces directly with the service planning analysis and reflects the resultant transportation network impedances accordingly. The main outputs are projected changes in ridership and revenue, and resultant impacts on land-use and socio-demographic indicators. The data interface provides an easy interaction with cost and financial modeling, economic impact analysis, and also GIS systems to allow for further downstream analyses and refined mapping of the model projections.

- **Operation and maintenance (O&M) cost modeling:** A cost model that allows for an evaluation of changes to O&M costs, as well as operating subsidies. The cost model incorporates outputs from the ATTune service planning, as well as the UDM/RDM demand model to provide a relatively quick evaluation of the cost implications of different service plan changes. The model is detailed enough to capture various O&M cost components, but at the same time is also broad enough to allow for an aggregate analysis of the key cost implications. Steer also incorporated an add-on tool that allows for a financial feasibility

analysis if major infrastructure investments are needed to facilitate the service plan.

- **Economic impact analysis:** A suite of tools that analyze the economic impact generated by investment in the transit or rail system and the subsequent increased spending to operate the system. This analysis can be based on input-output modeling, the capture of wider economic benefits (WEBs), or a combination of both. More and more of our clients value this evaluation as a crucial component in making the case for investment in transit and rail systems, especially where significant public funds are required. In combination with the land-use impacts projected by the UDM/RDM, economic impact analysis is a highly effective way of demonstrating the full implications of transit and rail investment, not only for the passengers, but also for the entire region.

We have successfully applied this suite of tools in numerous projects across the globe and helped our clients analyze a wide range of scenarios from minimum approaches to visionary and transformative projects. We believe in decision-making processes underpinned by rigorous analysis and facts: our integrated modeling suite provides clients with this rigorous base, while also managing the complex balance of short and long-term planning pressures.

Stay tuned for more example of our tools in action in the future.



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News in brief

Knowledge-sharing across Steer

Steer prides itself on leading industry innovation and providing the best people for each project. We draw upon our international staff resources to bolster local staff, combining on-the-ground knowledge with a global perspective of best practices.

To ensure that our offices are kept mutually informed about company and industry developments, we actively engage staff at all levels in bi-monthly knowledge sharing seminars. Through these seminars, staff are invited to share information about their projects, industry trends, legislative changes and research outcomes. For example, recent topics have included trends in AVs, changes to land use planning regulations and their impact on transportation, professional ethics best practices, transportation demand management ordinances in local government, and the results of our latest economic forecasting research.

The knowledge sharing seminars are done both at a macro and micro level, with programs running parallel for all of North American and specific teams. This allows staff to share best practices and research, while also focusing on local issues and discipline-specific skills and knowledge.

The knowledge share seminars foster collaboration throughout the company and help staff continue to enhance their skills and knowledge. They help foster creative solutions and best practices across all our projects and lead cutting-edge trends and solutions.



Livability and the value of public spaces

By Lucile Kellis



What makes a public space more attractive than another? Can we measure the economic value of streetscape improvements to help direct public funding toward the most promising projects? Which street features will deepen the social fabric of a city?

Those questions are at the center of many American cities today. Scarce resources coupled with growing city centers make it all the more challenging to prioritize revitalization projects. There is a need to understand the value of the various benefits from street improvements to help justify funding. However, it can be difficult to quantify the value of public realm improvements. Cost-Benefit Analysis methods are used around the world to prioritize projects, but they require access to quantifiable measures of benefits. What is the added benefit of a bench to a city plaza? Would adding tables be more effective than adding more green spaces? Those are difficult decisions that have no straightforward answers and require an in-depth analysis of the inner dynamics of each city.

Today's trend is a return to urban living, a reversal from the rapid suburbanization and sprawling communities of the 1950s. City centers are (re)becoming places where one can live, play and work. As a by-product, city officials around the country are working to render those city centers

more livable by encouraging street life, increasing safety and reducing vehicular traffic.

Public spaces play a vital role in the social and economic life of cities, and well-designed city plazas and streets provide clear evidence of the importance of public space in creating safe, livable communities. They deepen the social fabric, enhance street life and contribute to social cohesion. A variety of street and plaza improvement projects can be proposed to achieve these goals; projects ranging from short-term plaza improvements using temporary materials to actual street reconstructions which are more expensive and require larger amount of funding.

Understanding the value of public realm improvements can both help secure and justify funding. Proper valuation of these amenities considers not only costs and benefits of construction and materials, but also the greater societal value.

Steer believes that understanding residents' valuation of urban spaces and streetscape features is instrumental in measuring social benefits for project appraisal and prioritization. Collecting behavioral data of residents is needed to understand the value placed on public space features. We use a livability valuation methodology that combines focus groups, urban design and behavioral

expert panels, and contingent valuation techniques to quantify streetscape improvements. These quantitative contingent valuation techniques include Stated-Preference and Best-Worse Scaling scenarios proposed to obtain monetized valuations of various improvements.

It can be challenging to devise appropriate payment mechanisms, the value options survey respondents can select for a specific amenity. We have developed methods to overcome these challenges to derive a valuation for the improvements. The Steer methodology is the first to quantify livability with innovative payment mechanisms designed to assess the value that residents place on public space amenities for Cost-Benefit Analysis and project appraisal purposes.

The livability valuation methodology Steer has developed can help quantify public space amenities and move towards a standardized system to understand improvements equitably.



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How Vancouver and other cities learn to improve transportation decision-making

By Devon Farmer

In 2015, Vancouver's City Council approved a plan for removing the aging Georgia and Dunsmuir (G&D) viaducts and replacing 2.6 kilometres of elevated highway with a surface boulevard, parks, public space, and housing. This was a controversial policy decision, evident by a split council vote and some vocal community opposition.

Arguments for removing the viaducts included that they are unnecessary, would require extensive maintenance to make them seismically fit, take up too much land, and act as a physical and visual 'barrier' that breaks up the urban continuity of Main Street, isolating Chinatown from the successful redevelopment of False Creek. Arguments for keeping the viaducts included that they are an important part of the road network, they may increase traffic on other local roads, and that their removal would result in a small increase in average travel times by automobile. Arguments were also raised to keep the viaducts, but to convert them into a New York 'High-Line'-style elevated park. Ultimately, City staff and consultants hired by the City recommended near-complete removal of the viaducts. The removal project is anticipated to begin within the next few years.

What happened in Vancouver

There is ample evidence to show that policy transfer [that is, learning from the examples of other cities] played an important role in the planning process that eventually led to the decision to remove the G&D viaducts. Perhaps even more importantly, policy transfer helped to justify the idea of not following traditional North American automobile-centric practices and renewing the G&D viaducts for another 30 years.

For this project, learning from the examples of other cities was done by many different policymakers (including consultants, City staff, and City Councillors) throughout all stages of the planning process. Frequently mentioned examples included San Francisco, with the Embarcadero Freeway removal; Seoul, with the removal of the Cheonggye Expressway; and Toronto, generally used as a negative example, for its failure to remove the Gardiner Expressway when they had the opportunity. Policy transfer was most apparent near the beginning of the policymaking process; during this critical time, the idea to remove the G&D



Seoul's Cheonggye stream restoration, photo by Kimmo Räisänen via flickr.com/photos/kimmomurmu/7090802091.

viaduct was first seriously proposed by a City Councillor. That Councillor justified the idea by referring to the San Francisco Embarcadero Freeway removal and the celebrated outcomes of that project. He became the publicly acknowledged champion of the project and was noted for consistently advocating for the project over the years after he initially tabled a motion for City staff to study the proposal in 2009¹.

Policy transfer can help

The G&D viaducts example tells us that cities do not need to 'reinvent the wheel' every time a challenge or opportunity is encountered when there are many interesting and successful examples of completed projects that highlight possible outcomes. If a city is facing a new challenge, chances are good that a similar challenge has been encountered somewhere else from which lessons could be learned.

As consultants, we continually work with cities around the globe and are exposed to hundreds of different projects and policy initiatives dealing with all aspects of city-building and transportation. Because of our experience, advancing controversial ideas is one area where consultants' knowledge of and our professional networks within other cities can be critically important. While it is unlikely that a policy or project

can be directly copied or replicated from another location, as with the G&D viaducts example, a synthesis of ideas and inspiration from other locations can be used to first justify the idea as a good one, and later be used to build a custom-tailored plan.

Urban viewpoints toward adapting or removing modernist mobility infrastructure [like elevated highways] are changing – cities and their inhabitants are learning that it is a worthwhile endeavor to advance equity and justice and to reclaim otherwise underused urban space. However, in many car-centric North American cities, these ideas still tend to be controversial, even in a city generally thought to be progressive like Vancouver. For advancing these controversial ideas, policy transfer can be a powerful and effective tool.



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¹For more information about the G&D viaduct removal project and the policy transfer that took place during the policymaking process, refer to Farmer and Per1 [2018] in Urban Research & Practice at bit.ly/2ss4Vyx.



Longer passenger trips despite declining passenger counts

By Darrell Smith

While the U.S. transit industry has been experiencing a ridership decline, Steer researched 10 years of data from the National Transit Database (NTD) to find that current transit riders are typically taking longer trips. This change presents transit systems with an opportunity to redefine their services to better meet their market strengths.

While the U.S. transit industry has been experiencing a ridership decline, Steer researched 10 years of data from the National Transit Database (NTD) to find that current transit riders are typically taking longer trips. This change presents transit systems with an opportunity to redefine their services to better meet their market strengths.

We analyzed the unlinked passenger trip (passengers) and passenger mile data from the National Transit Database for report years 2008 through 2017. While the Federal Transit Administration (FTA) has reviewed trends over a five-year period, we wanted to capture the period before the oncoming of new disruptive transportation services marked by the start of Uber in 2009. We limited our analysis to the 368 transit agencies and their respective modes that reported passenger and passenger mile data for each of the 10 years within our study period. As shown in figure 1, during this period, same-agency ridership changed from 9.698 billion passengers in 2008 to 9.131 billion passengers in 2017, a decrease of 5.85%. While ridership declined to 9.366

Figure 1: U.S. transit ridership by APTA agency size

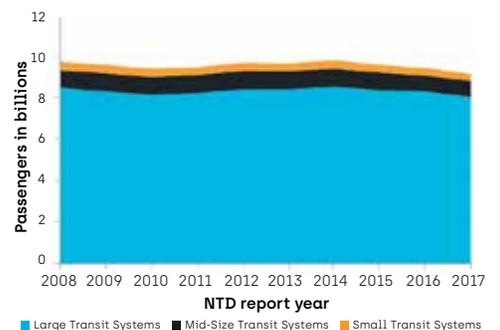
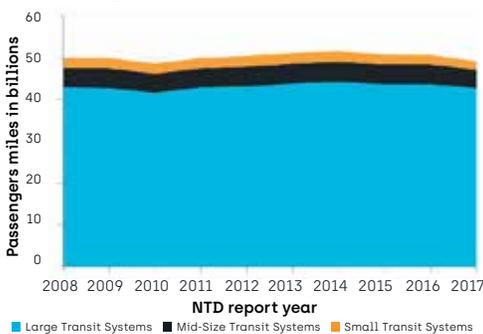




Figure 2: U.S. transit passenger miles by APTA agency size



billions passengers in 2010, it increased again to a high of 9.769 billion in 2014 before falling to 2017's low.

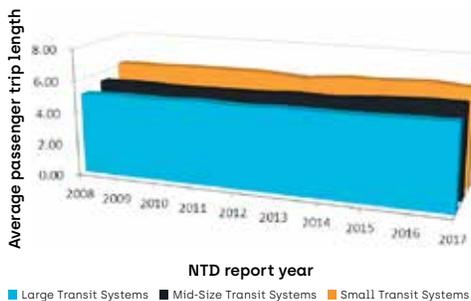
Figure 2 illustrates that the impact on the volume of passenger travel, as measured in terms of passenger miles, did not decline at the same rate. Same-agency passenger miles changed from 49.874 billion in 2008 to 49.186 billion in 2017, a decrease of only 1.38%. However, the 2017 passenger miles were not the low point during this 10-year period: in 2010 the same-agency passenger miles reached a low of 48.563 billion. As is seen in figures 1 and 2, these trends were largely consistent across the American Public Transportation Association's (APTA's) large, mid, and small transit agency definitions, although passenger miles for mid and small transit agencies reached their lowest point in 2017, rather than in 2010 as occurred with the large systems.

What does this data reveal? As figure 3 shows, the average distance each passenger traveled, in terms of average passenger trip length, increased over the 10-year period, from 5.14 miles in 2008 to 5.39 miles in 2017.

We organized this data by APTA's transit agency size categories in terms of annual passengers: 4 million or less defined as small, 4 million-20 million defined as mid, and 20 million or more defined as large. While passenger trips did not lengthen linearly each year across the three APTA agency size groupings, the overall trend of longer trips is clear. It is also interesting to note that the small transit agencies have the longest average trip lengths, followed by mid and large agencies, respectively. Small agencies average trip length was 6.18 miles in 2008 and 6.22 miles in 2017, having reached a high of 6.4 miles in 2016. Large transit agencies average passenger trip lengths ranged from 5.07 miles in 2008 to a high of 5.31 miles in 2017. Mid-size agencies ranged from 5.43 miles in 2008 to 5.79 miles in 2017, with the shortest of 5.39 miles reported in 2010, and the longest of 5.82 miles reported in 2016.

We also reviewed this same data by transit agency mode. Here we focus on only the modes that exist on at least 15 of the same-agency systems for the 2008-2017 period as illustrated in figures 4 and 5.

Figure 3: U.S. transit average passenger trip length by APTA agency size

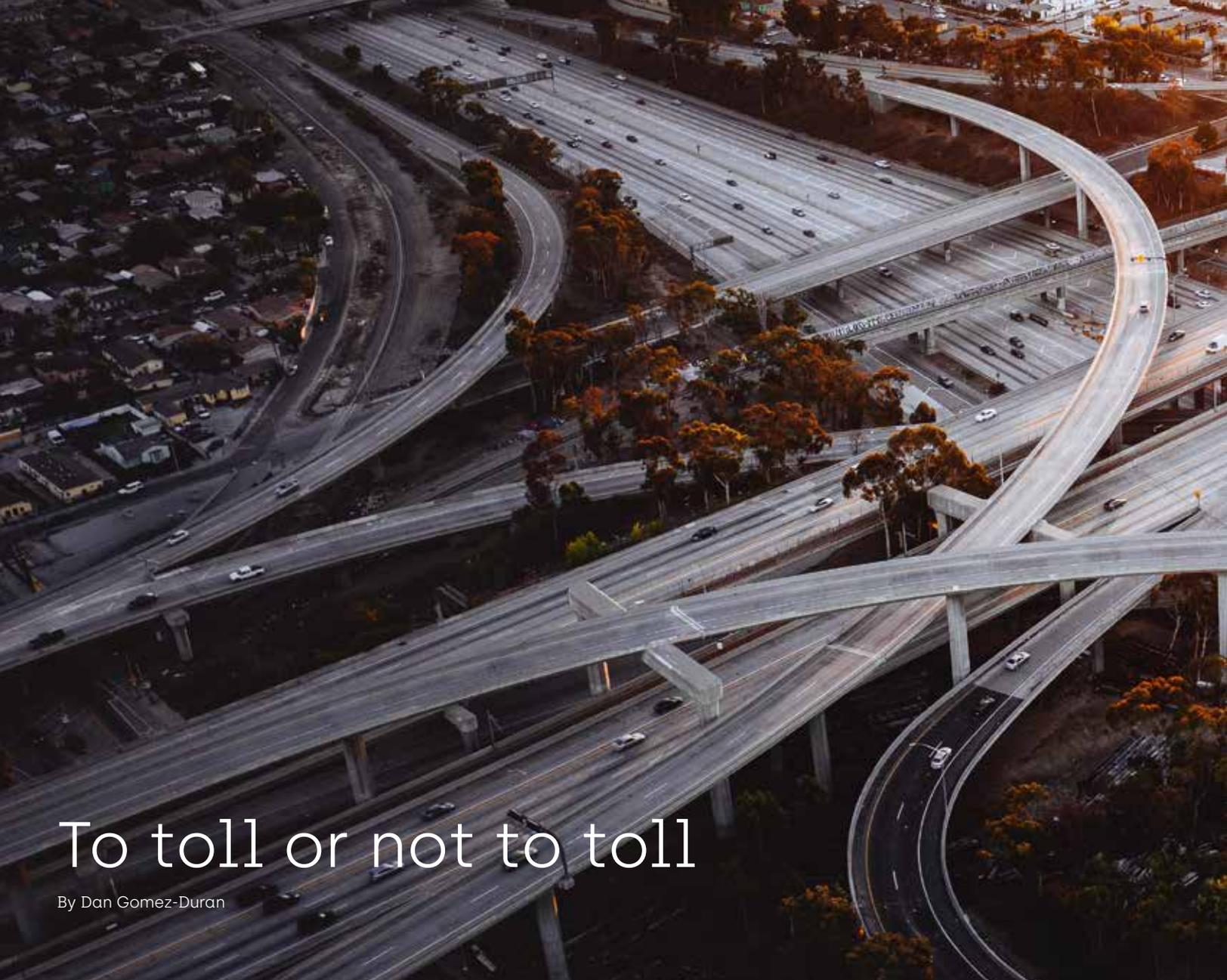


Vanpools, which have the longest reported trip lengths, experienced a 9.1% increase in average passenger trip length from 35.04 miles to 38.23 miles. Commuter rail, with the second longest reported average passenger trip lengths, experienced a 5.7% increase, from 23.42 miles in 2008 to 24.76 miles in 2017. Light rail passenger trip lengths also increased, by 4.6% from 4.79 to 5.01 miles during the 10-year period. Bus systems had the shortest average passenger trip lengths, but did lengthen 2.47% from 3.63 miles in 2008 to 3.72 miles in 2017. Heavy rail is the only mode where trip lengths shortened over the period, by 2.97% from 4.75 miles to 4.61 miles between 2008 and 2017. Also note that heavy rail had the smallest ridership decline of the modes analyzed, declining just 0.9% between 2008 and 2017.

While the specific changes experienced by each individual transit agency are likely to be unique among themselves, the overall trend of longer average passenger trips does coincide with the decline in ridership and the arrival of disruptive transportation services such as ride-hailing and bike-sharing ushered in with Uber's launch in 2009. While further research is needed to determine if these two changes are more than a coincidence, the change in passenger trip length is a factor transit systems should consider as they continue to evaluate their mix of service offerings.



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To toll or not to toll

By Dan Gomez-Duran

Tolling has been used to fund the construction of roads since Roman times and many toll roads are operational throughout North America today. In Canada, six tolled facilities, in addition to tolled international border crossings, are concentrated in the most populous provinces (Ontario and Quebec). Recently, there have been developments to tolling and pricing in Canada.

The rationale for tolled facilities is that they need to provide a time saving to compensate for the toll charge incurred. Toll facilities fall under the following categories:

- **Bridges/tunnels:** Tolled facilities can help deal with physical natural barriers such as rivers and mountains. They can be free-standing such as the Confederation Bridge connecting New Brunswick and Prince Edward Island, or in competition with other facilities such as the A25 and A30 bridges in Montreal.
- **Congestion 'avoiders':** While bridges and tunnels deal with natural barriers, tolled facilities can also offer a quicker and more reliable option to congested corridors. In Canada the best example is the 407 ETR in Ontario.
- **Long distance/inter-urban:** In this case the facility provides a time saving over a longer distance resulting in a geometric rather than congestion time savings. In these cases, there are small time savings

per kilometre, but these accumulate to large benefits and provide a stress-free driving experience. In Canada this would include Highway 104 in Nova Scotia, a 45-kilometre tolled section of the Trans-Canada Highway. They are more common in the U.S., including the New York Thruway and the Indiana Toll Road.

Toll lanes in the U.S. are a relatively recent concept, where new lanes are built or existing High Occupancy Vehicle (HOV) lanes are tolled (with HOV requirements generally increased from 2+ occupants to 3+ in the toll lane scenario) to provide a good level of service on the tolled lanes through dynamic pricing. They are also known as value priced lanes, managed lanes, express toll lanes or High Occupancy Toll (HOT) lanes. They are expanding rapidly in the U.S., but there are no examples in Canada. One of the main advantages of toll lanes is that they provide a travel alternative to the general purpose lanes and this can respond to



potential fairness issues which 'full' toll facilities, especially new ones, need to address.

Related to the impact of tolls, it is important to highlight the public and political pressure on toll facilities. A recent example in Canada includes the removal of tolls by the BC provincial government on the Port Mann and Golden Ears bridges in Metro Vancouver in 2017 which resulted in traffic increases of 25% and 30% respectively. The flipside is the \$150 million and \$50 million revenue shortfalls from the toll removal and the need to tap into government funds to cover debt repayment from the bridge construction and the decommissioning of toll collection systems.

Furthermore, the challenges of tolling existing roads or bridges (even if they are to be upgraded) cannot be overstated, as evidenced by the removal of tolls planned for the Champlain Bridge replacement project in Montreal in 2015 and Ontario's provincial government stopping the City

of Toronto's plan to toll the Gardiner Expressway and Don Valley Parkway in 2016.

This presents a considerable challenge to policy makers as there is constant pressure on government resources across all sectors of society and a lack of funding to cover these needs. The user pay principle of tolled facilities provides a potentially valuable tool to deal with this challenge, but as indicated previously the public (and political) pressures are considerable.

The latest development in Canada to 'square this circle' has been the concept of mobility pricing as a method to provide a more holistic approach to balancing infrastructure funding, congestion management and promoting fairness. A mobility pricing independent commission in Vancouver recently completed its work and identified two broad mobility pricing concepts: a regional congestion point charge with charge points at, or close to, some, or all, of the regionally important

crossings and a distance-based charge with two or more zones with varying charge rates throughout Metro Vancouver. The study found similar results in terms of congestion reduction, household costs and revenues, but acknowledged that more analyses and discussion would be required.

The continued population growth of urban centers in Canada, increasing traffic congestion and the limited funding for infrastructure represent a challenging problem and it will be interesting whether tolling makes a 'comeback' in Canada or some sort of mobility pricing is implemented to address these pressing issues.



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Scoot commute, the new mobility for employers in Santa Monica

By Nathan Pope

Nearly every month, a new mobility service pops up aimed at commuters. From shared scooters or ebikes, to microtransit services, to carpool matching apps, employees have more choices than ever for their daily commutes. But will they use them?

Transportation Demand Management (TDM) techniques have traditionally focused on encouraging walking, biking, public transit, carpooling and vanpooling. New mobility options can offer the same benefits as traditional transportation modes (fewer emissions, healthier habits, time savings), but often have different barriers to entry (new devices and technology, shared ownership). Therefore, marketing and encouraging these new options requires new ideas and methods for fostering behavior change.

In California, Santa Monica has been ground zero for new micro-mobility deployment. In September 2017, the first electric Bird scooters appeared on a Santa Monica street, seemingly from nowhere. Less than a year later the City launched a Shared Mobility Pilot Program that brought more scooters and ebikes to city streets. Combined with Santa Monica's existing bike share, municipal bus service, and light rail connecting to downtown Los Angeles, there have never been more options for getting around the city.

Santa Monica is also a regional job center with over 88,000 daily in-bound commuters, nearly doubling the population. Hence, the way in which these commuters arrive to the city each day dramatically affects local traffic and emissions.

How can employers and their employees take advantage of new mobility options? To help answer this question, the Steer-operated Santa Monica Transportation Management Organization (GoSaMo TMO)

brought together a group of employers to sit down with new mobility companies and discuss everything from scooters to carpools. Representatives from mobility companies Bird, Jump, Lyft, Waze Carpool, and Micro Kickboards were all on hand to discuss what they could offer Santa Monica employers and their employees. Employers asked questions about trip tracking, liability, and costs, while encouraging the mobility companies to make their employer programs easy to implement. At the end of the meeting employers were able to network with the mobility company representatives and their fellow employers. The TMO continued the conversation by sharing the results of the meeting with those who were unable to attend and connecting them with the new mobility providers.

Employers continue to come to the TMO and say anecdotally that they see their employees using these new services. It is not currently possible to determine exactly how many commuters are using shared micro-mobility services to get to work, but the number of people in Santa Monica choosing them is staggering. According to City data, there were roughly 150,000 rides on shared scooter and ebikes in November 2018 alone. It is still very early on for these new transportation solutions and only time will tell how big their impact has been on commuting. The TMO continues to help all employees and employers understand what these new transportation services are and how they can take advantage of them.

Steer has operated the GoSaMo TMO since 2016, helping employees, residents and visitors understand their transportation options and encouraging the reduction of drive alone trips.

Shared mobility experts

Steer has delivered projects internationally across a range of disruptive technologies, from dockless bike share to on-demand minibuses and autonomous vehicles, offering insight to employers, service providers and agencies alike. We are passionate about how new technologies can help shape our urban environments for the better. Steer is adept at advising both operators and public bodies worldwide, providing knowledge, insight and guidance on the implementation and development of technologies to complement existing services while maintaining a commercial understanding of business needs.

Our team brings together experts in new transportation technologies, data analytics, planners and technologists to provide a holistic understanding of how to minimize challenges and maximize opportunities.



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Learn more about the GoSaMo TMO project at bit.ly/2DAyIva.



Transit infrastructure: from vision to reality

By Alan Jones

As our urban areas grow, decision makers and planners grapple with the challenges of congestion, air quality, and longer-term climate change trends. Transportation disruptors, autonomous vehicles and other mobility providers are adding choices, but investment in transit infrastructure remains a key component in the urban planners' toolkit.

To some, the benefits of new transit infrastructure seem obvious: fast, high-capacity, efficient, reliable and safe alternatives to the automobile, helping to realize wider city-shaping objectives. However, transit project delivery is often mired in controversy, triggering high profile political debates, polarized responses from the public, objections and legal challenges, and not to mention, the need to secure funding and environmental approvals, complex procurement, delays and budget overruns. Despite these challenges, many transit infrastructure projects have had a transformative impact on cities, their communities and businesses.

What are the lessons learned from successful transit projects? Here is the Steer checklist to ensure successful delivery of transit projects, drawn from our extensive experience in supporting transit infrastructure project delivery around the world.

1. Understand that all transit infrastructure projects are political projects, with varying degrees of technical content. Aligning federal, regional and local views, or giving state and local government the power to determine and deliver transit projects is critical, ideally with a political champion to lead the case for the investment.
2. Utilize municipal planning documents to provide the context for any transit infrastructure project.
3. Develop a vision for the transit project, and make sure the vision can be translated into tangible components of the project and measurable goals. Be clear on the objectives and the outcomes. Know what success will look like.
4. Make evidence-based decisions. A demand-led approach is required to guide the discussions and decisions on transit technology choice. Make sure the analysis is thorough and



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studies and robust cost estimates for construction and operations are central to defining the project scope. A 'no surprises' approach, with all components covered (utilities, urban design, environmental impacts) is the best guarantee of success.

7. Secure the funding. From grant funding to private finance to value capture, funding sources and requirements vary. Start early on assembling the funding, using the project evidence base and business case to justify the investment. Consider the entire project lifecycle, including extended operating contract/concession periods.
8. Plan the procurement. The detailed design, supply, construction and operation of a transit infrastructure project is complex and there are multiple options for project procurement, increasingly through P3s. The project vision/goals must frame the procurement approach, avoiding the different viewpoints of contributors to dilute or value-engineer the project away from its critical components.
9. Work towards an integrated outcome. Successful transit infrastructure projects are not developed in isolation. They contribute to wider city-shaping initiatives and should compliment related policies and plans, transit-oriented development (TOD), wider transit network restructuring and urban realm improvements, creating thriving places for people and businesses.
10. Tighten the timescales. The average political lifecycle does not encourage the long view required for the coherent roll-out of a transit network, or even an infrastructure project within a single corridor. This creates a real prospect of changing political views delaying or even canceling a transit project. Cross-political consensus can reduce the risk, with the evidence-based approach used to ensure continuity. At the same time, scope the project to speed up the technical project development process where possible.

Transportation infrastructure may be challenging to plan and implement, however if you keep these guidelines at the forefront, the results can be transformational.



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Service and operation planning

As communities and decision-makers become more attuned to the value and role of transit in urban mobility, planning and implementing innovative plans for services that optimize capacity to support demand are becoming increasingly important. Steer continues to support agencies and cities in the achievement of these outcomes by developing, testing and challenging strategies to make best use of existing and future resources.

Some of Steer's current projects include:

Sound Transit in Seattle, Washington are progressing the delivery of their ST2 and ST3 plans which will see the Link light rail network expand to 116 miles by 2041. Steer is working to develop operational strategies for each stage of system development, considering the timing of infrastructure, fleet procurement and operational facilities to identify how different service strategies can best meet future passenger demand.

TransLink in Vancouver, British Columbia continues to see significant increases in transit ridership, including on the SkyTrain system. Steer is developing and evaluating different potential operational strategies for future SkyTrain service plans, considering the timing of ongoing infrastructure improvements, vehicle replacement and the delivery of additional fleet to meet future demand.

The Ministry of Transportation of Ontario are developing plans for High Speed Rail between Windsor and Toronto. Steer supported the development of the project concept and business case. This included understanding the future system operation and how it could be integrated and interoperate with the expanding Go Transit rail network and services.



well-documented. Revisiting the transit choice at subsequent stages is distracting and time consuming. Business cases and multiple account evaluations should be deployed to support decision making. Use a 'business case tracker' as a tool for regular checks that the transit project, as it evolves, will still deliver the vision/outcomes.

5. Consult widely and ensure the silent center voice is heard. Extreme views for and against transit can generate much attention, but thorough and well-informed consultation with stakeholders, communities and businesses should be used to ensure there is a consensus for change. There will be groups with genuine concerns and their issues should be addressed as far as possible within the project design process
6. Develop the detail. Planning a transit infrastructure project is complex and detailed designs,

The future of transit infrastructure investment in Canada

By Myriam Langlois

Over the past several years, all levels of Canadian government have embraced transit as a way to manage increasing congestion in cities, enhance mobility, ensure economic competitiveness and reduce carbon emissions. As the transit industry works to provide urban mobility solutions, it is important to understand the types of investments that transit systems need and the level of actual investment they receive. Steer has recently worked with the Canadian Urban Transit Association (CUTA) to complete a survey and develop a predictive model to gauge transit infrastructure and funding needs for Canada through 2028.

Several key factors are currently shaping transit infrastructure investment needs, including:

- Population growth**
 Population growth is a challenge that many transit agencies in large cities address by building capacity and improving service [through technology integration or/and expanding service]. Identifying sustainable revenue streams is key to expand service to meet growing transit demand. However, trends in costs and revenues show that current revenue sources are not keeping pace with the growing financial needs.
- Infrastructure deficit**
 Like many western countries, Canada has a well-documented infrastructure deficit, including in the transportation industry, which has emerged due to decades of underinvestment. In the past two decades P3s have emerged as a prevalent delivery method to reduce the infrastructure gap in Canada. The increased number of P3s and other new approaches to procure transit projects is a trend that is likely to continue as fiscal constraints increase. All governments have shown growing interest in exploring

private sector investments, ownership options, and alternative financing mechanisms to increase investment in new and existing infrastructure.

- Climate change**
 Across transit agencies and government bodies, climate change is a key driver of risk and uncertainty. As Canada experiences more frequent extreme weather conditions, the effectiveness, lifespan, maintenance, rehabilitation and renewal of existing infrastructure will be affected. Canada has responded to these risks and uncertainties by declaring lower emission targets and increased funding to support alternative fuel technology. Consequently, integrating new technology will be costly in the short-term and the unit costs of maintaining and expanding existing transit infrastructure will be more expensive than before.
- New technology**
 As the demand for a low-carbon market and tightening emissions regulations drive technology changes, the challenge lies in acquiring additional funding to support the high costs associated with introducing technology and the infrastructure required to support it. Increased costs associated with technology changes do not guarantee increased transit in terms of coverage and ridership.
- Customers' expectations**
 In addition to environmental considerations and accelerated population growth, changes in consumer expectations are challenging transit agencies to expand and elevate service quality at the same time. In response, transit agencies and government are looking more towards private partnerships and alternative funding procurement and sources to fill the gap in funding and technological innovation.

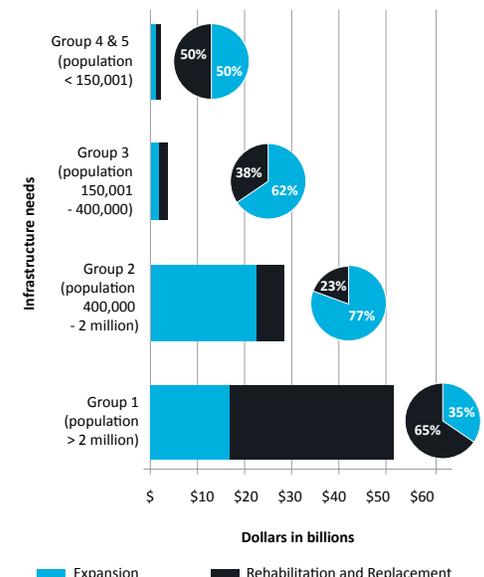
2018-2028 transit infrastructure needs outlook

In the summer of 2018, CUTA commissioned Steer to develop and conduct a national transit infrastructure needs survey, develop a forecasting model to supplement missing data and assess potential investment scenarios for the next decade. This study allowed us to better understand the transit infrastructure situation in Canada.

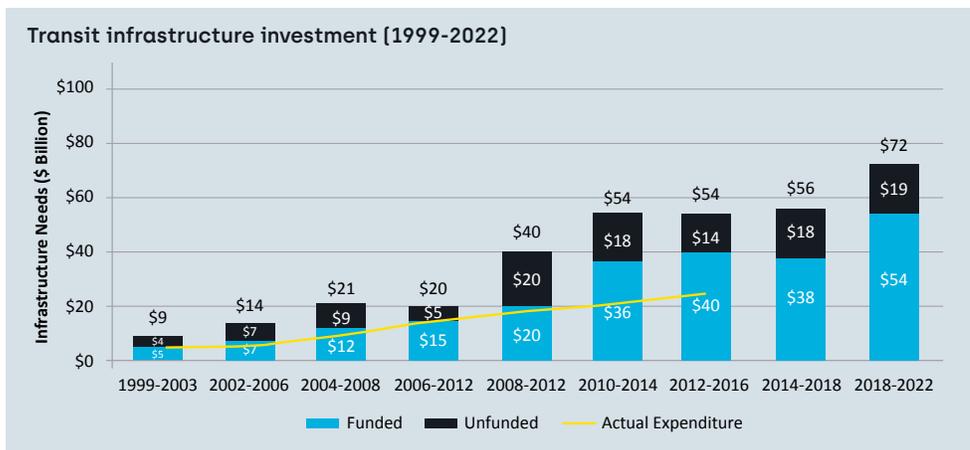
Level of investment needed

We estimate Canadian public transit systems need more than \$130.6 billion to pursue their planned, unprecedented growth over the next decade. This \$130.6 billion includes both infrastructure projects for which funding has already been allocated or committed, as well as projects that are currently unfunded

Type of infrastructure needs by population group (2018-2028)



Note: Group 1 excludes future spending planned by Metrolinx and Exo. These agencies overlap multiples cities.



Source: Previous Infrastructure Needs Survey and CUTA Fact Book

and can only be completed if additional funding sources were made available. Funded projects make up \$72.8 billion, or slightly more than half (56%) of the infrastructure needs for the 2018-2028 period.

Canada's three largest metropolitan centers (Toronto, Montréal and Vancouver) report the greatest infrastructure needs in Canada, totaling more than 61% of the country's needs over the next decade. Future expenditures of the transit agencies in those centers primarily focus on maintaining the quality of existing infrastructure, while regional agencies focus on expanding and integrating transit network and services cross the metropolitan region. Smaller communities appear to focus more on the expansion of their current operations to respond to new demand.

Growth in investment

Transit capital investment requirements in Canada have developed over the past decades as federal, provincial and municipal governments increased their

investments in public transit, ensuring that people move freely in a highly competitive economic environment while reducing emissions. The figure above presents the total infrastructure investment needs in five-year increments from 1999 to 2022. Canada's transit infrastructure investment continues to increase from the 1999-2003 baseline, to the current estimate of \$72.2 billion for the period 2018-2022. This is reflective of a national effort to expand transit networks across the country, particularly in larger centers.

The figure also reflects that actual spending, provided by federal, provincial and municipal governments, has fallen behind projected needs (even funded needs) as the level of projects has increased. Transit agencies across the country appear to have accumulated a backlog of infrastructure projects. Delay in construction projects is a common phenomenon and often a costly problem that will need to be tackled in the next decade. Another explanation for this trend could have to do with accounting: the federal government, who began growing

its commitment to transit funding around 2006, makes its contribution to a given project only after receipts have been filled by project proponents, delaying actual expenditures.

Conclusion

Efficient and sustainable public transit plays an important role in keeping Canadian communities among the best places to live in the world, while contributing to clean economic growth. To ensure that transit systems continue to meet their overall mobility objectives, as well as transit mode share and emissions targets, federal, provincial and municipal governments, as well as the private sector and citizens, need to collaborate and find new innovative funding solutions to sustain extensive expansion of transit networks across the country while maintaining the state of good repair in current and future assets. This includes finding ways to reduce delays in the procurement and funding processes as well as developing a stronger understanding of the importance of infrastructure funding to economic, environmental and local mobility objectives.



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The full report is available on the CUTA website:
bit.ly/2Mn2fv0.

True threat (or not) from new mobility

By Ian Sproul

New mobility is influencing travel behavior, sparking planners and riders to ponder how these technologies will materialize in the future, and cities and agencies to think about how to embrace these new technologies. New mobility is wide ranging, covering everything from dockless bicycle providers to hyperloop. To narrow the topic, we have focused on the future of autonomous vehicles (AVs) and connected autonomous vehicles (CAVs), and their role alongside one of the most recent influential disruptors, Transportation Network Companies (TNCs).

When TNCs initially emerged, they offered an enhanced on-demand, point-to-point service for customers using driver-operated cars within the existing road network. This business model focused on three key elements: use technology to connect with customers, minimize journey times to attract demand, and provide variable pricing based on demand to optimize financial returns. Some TNCs have expanded their service line to pool customer trips within larger vehicles to and from common destinations. The benefits TNCs bring to the customer include ease of use, improved journey experience, and shorter journey times. Consequently, in some cities, there has been a reduction in passengers using traditional taxi and transit services. As a result, these TNC trips are effectively increasing single person car trips, contrary to most city and regional goals to reduce these. For example, some commuters may choose a TNC instead of transit, leading to increased congestion and emissions.

With the rapid development and push towards AVs and CAVs, it is inevitable that these new vehicles will be deployed in increasing numbers in the next decade. Before this transformation, there are key

questions that need to be addressed: how are these technologies going to further disrupt the transportation system, what are the benefits, and how should they fit within the larger transportation network?

- **Reducing vehicle trips and miles traveled**

This shift to AVs and CAVs will likely be led by TNCs and could catalyze a shift from the current private car ownership model. It is also likely that existing vehicle manufacturers may align themselves with these service providers or begin providing these services directly to support the vehicle manufacturing business. These shared vehicles will provide more trips than the private vehicle, but are unlikely to reduce the number of vehicles on the road in a meaningful way if users increase their trips and more companies are encouraged to enter the market.

- **Enhancing roadway safety**

AVs and CAVs have automated systems that are able to react and stay focused on changing road conditions better than human-operated vehicles. Therefore, AVs and CAVs provide the opportunity to significantly reduce driver related collisions.

- **Optimizing the road network**

Widespread CAV deployment will increase connectivity by allowing vehicles to be more efficient within the road network. This could mean CAVs would avoid road work, incidents or events to find alternative routes and spread the demand across corridors. CAV technology may also allow vehicles to platoon to better optimize the distance between vehicles, providing the shortest safe stopping distance. The timeline to achieving these benefits will depend on the majority of vehicles in the future

having the same technology. This ability to maximize network capacity is nothing new, and a warning from the past is when Scoot was used to optimize traffic in London, until a series of small incidents lead to gridlock in the city. Also, the opportunity to optimize our road network only exists where roads are not already at capacity.

The big question is will AVs and CAVs increase the number of cars on our roads and reduce the number of people in each vehicle? If CAVs are not able to significantly increase road capacity and the majority of vehicle end up having a single occupant, then their widespread use could increase congestion.

This raises the issue that many cities are now considering: will AVs and CAVs make best use of limited transportation corridors or would higher capacity transit make better use of the space and achieve a better outcome?

As the pace of change increases and we speed towards a different future with new mobility, we need to better understand where this might be the greatest benefit to our overall transportation network, such as rural connectivity, first and last mile transit access, and in particular mobility for an aging population. New mobility may need new regulations, and a greater focus on changing people's behavior away from single occupancy trips. We could well be moving from the private car to mobility as a service with no net benefit, and in the process wasting an opportunity.



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News in brief

Optimizing the requirements and benefits of High Speed Rail

Many countries around the world have benefited from the development of High Speed Rail (HSR) networks. Investment in HSR has been shown to expand connectivity, increase economic productivity, and provide lower emission mobility options for medium to long distance travel.

Today, HSR is seeing increased interest across North America, with a wide array of projects and studies underway. The focus of many projects is providing improved connectivity, faster journey times, and additional capacity between major urban centers. However, if HSR is to realize benefits that are commensurate with its significant costs, project proponents and sponsors should consider a wider range of benefits when planning and designing new projects.

Rather than focus on technology, Steer has taken a "market-led" approach to HSR planning, identifying the range of travelers and the benefits and costs of a system servicing them. This provides our clients with integrated rail plans that include HSR, regional and commuter services, similar to some of the more successful HSR systems in the world. For example, in the U.K., HS1 is used for both high speed intercontinental passenger services and local commuter rail services for the southeast of England into London.

This approach helps to maximize the capacity of infrastructure and increase the benefits of the investment. This approach is helpful in North America, where it can be difficult to utilize existing rail corridors for passenger services and is costly to develop new corridors. Steer has helped clients maximize the benefits of new HSR corridor projects by looking at overlays of different rail services, including point to point HSR, wider regional stopping services, commuter services and premium airport rail connectors.



Transportation equity through fiscal policy

By Leslie Buckman

Adopting a commercial approach to pricing limited road space or transit can be a tricky topic. It is often rejected on the grounds that pricing disproportionately disadvantages people with low or fixed incomes, while those who can afford to pay gain the benefits of a less congested network. Finding a way to implement modest changes to the progressive tax system can address these obstacles and create a larger role for pricing in transportation policy.

Transportation economists have long argued that congestion on the road network can be mitigated or removed through the thoughtful use of pricing. Despite this, only a limited number of downtown city areas (e.g. London, Singapore and Stockholm) have adopted road pricing. Additionally, most publicly operated transit systems are not able to cover their direct operating costs through fare recovery, and seek outside investment for capital and renewal costs due to the low (in commercial terms) fares charged.

The limited use of road pricing and high prevalence of low transit fares can be linked to a variety of factors, including the commonly held equity based rationale for low or zero transportation pricing. This has constrained policy makers from using pricing to influence transportation demand, both in absolute terms and in terms of mode choice. Mitigating equity concerns would allow pricing to become an integral component of the transportation policy toolkit and reduce the direct subsidies required for much of the transportation network.

The transportation pricing challenge could be considered a wider societal issue of income distribution, however a more targeted approach until a wider policy narrative can be discussed is recommended. For example, promoting a revenue neutral system, whereby the additional revenue raised by pricing transportation is used to enhance the system and further invest in transportation infrastructure. However, the design of such a system would need to avoid simply recycling the revenue back at the level paid, as this would provide little incentive to change behavior, and may make equity considerations worse, given the impact on cash flow of those on low incomes. Instead, a combined approach is possible, one that combines revenue neutrality alongside a mechanism that returns revenue disproportionately to low income



households. Transparent and simple revisions to the tax system may be a way to achieve this.

Possible approaches could include increasing income tax-free allowances or credits where funding is primarily via income taxes (e.g. for national or state/provincial highway systems). For property tax funded systems, introducing or increasing a non-taxable allowance or credit would return money to those in lower value residences and by inference lower incomes. More fundamentally, the long proposed Universal Basic Income (UBI) may be a route that could encompass increased use of transportation pricing, although as intimated earlier, the case for UBI is much broader than just transportation.

Obviously, any changes to the tax system would need to be grounded in the governance structure of the transportation system and associated funding sources. Such changes should simplify governance since the transportation agencies affected

would become more financially self sufficient, relying less on interagency governance and funding arrangements.

In summary, the ability to use pricing as part of a transportation policy toolkit is often limited by genuine concerns around equity implications. However, a well-developed proposal that compensates users that pay, with a focus on low income users, would mitigate such concerns. Better integrating transportation and taxation policy will provide a wider range of transportation policy options, and ultimately better transportation systems.



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It is time to consider smart fares

By Patrick Miller

Fare smart cards have been adopted across North America with over 60 agencies already providing card based ticketing and many additional ticketing programs are under development. As more agencies adopt smart cards there is a significant opportunity to leverage this new technology to grow ridership and revenue with smart fares.

Transit agencies and operators seek to optimize their ridership and revenue while achieving other strategic goals and policies. Typically, ridership growth is seen as an additional cost – either fares are decreased or more service is deployed to grow ridership. An emergent trend to grow ridership without significant new investment is to leverage new automatic fare collection or smart card technology to implement advanced fare structures. These advanced fare structures or ‘Smart Fares’ include a range of approaches to set fares that encourage ridership growth, while meeting commercial targets and achieving broader policy goals.

At a high-level, smart fares vary from historic approaches to fare setting and leverage technology to establish more dynamic fares:

- **Customer focused:** Define prices based on specific customer travel patterns and needs, rather than using a one size fits all approach. [Example: moving from a set period pass to a frequency based discount or a loyalty program with a commercial partner.]
- **Variable:** Set prices to vary by time of day or customer type. [Example: setting off peak fares at a rate lower than peak fares.]
- **Flexible:** Modify prices based on emergent conditions to incentivize ridership. [Example: discounts during construction or service disruptions.]
- **Integrated:** Align prices between multiple mobility providers to allow for seamless ticketing and payment.

The potential benefits of smart fares include ridership and revenue optimization along with directly supporting broader policy objectives. For example, smart cards allow agencies to understand customer travel patterns, which can aid in service planning. This data can also be used to optimize smart fares based on customer use patterns. Agencies can use traveler history to develop loyalty programs where passengers receive discounts or other



awards based on frequency of travel, or even deploy event specific pricing to increase transit mode share to sporting or other major events. These approaches encourage increased ridership from discretionary travelers who may be reluctant to buy a traditional monthly pass, but will seek out a discount or reward by taking multiple trips on one fare card.

Another example of smart fares, which has seen use in North America already, is time of day pricing where customers in the off-peak have a lower fare than travelers in the peak period. This approach to pricing may shift demand to times of day when buses or trains are already less crowded or carry fewer customers. This means travelers in the peak benefit from less crowding and agencies can make better use of capacity that is already being provided. In some instances, the influx of new off-peak demand could cover the lost revenue of lowering the fare or even grow revenue, allowing an agency to increase its ridership and customer comfort without additional expenditure.

Family based pricing has also been explored to encourage more evening and weekend ridership. While many agencies may offer a free child fare, smart cards could be used to link multiple travelers as a group and apply a discount if a set of smart cards are used to travel together.

While smart fares have seen more widespread use in Europe and Asia, there is a growing opportunity to identify how the benefits of smart fares can be realized in a North American context. Early leaders in this field have already implemented time of day pricing and are exploring new approaches to loyalty and customer centered fares. With the emergence of new mobility providers, there are further opportunities to explore how to provide smart fares across multiple service providers to manage congestion on roadways and crowding on transit, while also achieving ridership and revenue targets.



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Reducing California's greenhouse gas emissions through TDM

By Kate Bridges

California is making progress towards its goals to reduce greenhouse gas (GHG) emissions to 40% below 1990 levels by 2030. But to ensure the state reaches that target, local and regional governments will need to encourage people to drive less.

To do so, some cities are using Climate Action Plans (CAPs), transportation demand management (TDM) ordinances and changes to the development review process to align local efforts with regional and state policies to reduce GHG emissions.

The California Air Resources Board reported in July that the state had reached the first of its GHG reduction targets, to meet 1990 pollution levels, ahead of its 2020 deadline. In 2016, the state produced 429 million metric tons of carbon dioxide (MMCO_{2e}), a roughly 13% drop from its peak in 2004. Both per capita GHG emissions and the intensity of pollution in relation to gross domestic product also decreased. According to the state's annual inventory report, shifts in energy production, from coal to renewables and hydro-electric power both in and out of state, are the biggest factors contributing to these reductions.^[1]

As a percentage of the total, the transportation sector now produces roughly 40% of total GHG emissions.

Table 1: California's greenhouse gas reduction targets

Target	Year	Legislation
1990 Levels[431MMCO _{2e}]	2020	Assembly Bill 32 (2006)
40% below 1990 Levels	2030	Senate Bill 32 (2015)
80% below 1990 Levels	2050	Assembly Bill 32 (2006)

Passenger vehicles contribute 120 MMCO_{2e} per year, surpassing heavy-duty vehicles and other on-road sources. Thus, despite the adoption of alternative fuels and more efficient vehicles, our reliance on driving cars generates the bulk of our transportation GHG emissions (about 70% of the transportation sector), not to mention other harmful pollutants.

The latest Assembly Bill 32 scoping plan recognizes that vehicle miles traveled [VMT] reductions are necessary to meet 2030 targets, and provides a general list of strategies for implementation at the local and regional level to get us there, which include infill development, infrastructure, pricing policies and transportation efficiency/TDM measures.



Regional and local governments will be integral to these efforts. Per Senate Bill 375, the Air Resources Board sets GHG targets for each region in California. Metropolitan Planning Organizations (MPOs) have the responsibility for developing Sustainable Communities Strategies to meet those targets. Local governments may implement CAPs or other policies to guide how these reductions are achieved at the municipal level, whether through VMT reduction, better building practices, or renewable energy sources.

Some cities who have adopted Climate Action Plans have included behavior change targets. The City of Carlsbad's CAP, for example, aims to increase alternative mode share to 40% by 2020. In 2018, Steer worked with the City of Carlsbad and the San Diego Association of Governments (SANDAG) to develop and draft a still pending municipal TDM ordinance, which was required by the CAP to help meet its objectives. A TDM Ordinance typically mandates that developers and/or property owners take

some degree of action to limit the single occupancy vehicles trips to/from their site, using a combination of carrot and stick strategies such as site improvements, parking management, financial incentives, education and marketing. TDM Ordinances are by no means specific to California cities and vary depending on regional goals and objectives, regulatory environment, geography, land use patterns, and monitoring programs.

The City of Los Angeles is also in the final phases of developing a TDM Ordinance for commercial and residential development. This ordinance will require property owners to make site improvements that support use of alternative modes and implement commuter benefits programs for employees and residents. It also measures project performance towards specific mode share goals over time, by requiring that property owners regularly survey employees and residents. At the same time, both Carlsbad and Los Angeles are changing their development

review process such that traffic impacts are measured by VMT, not by level of service [prompted by Senate Bill 743]. This change favors the use of TDM strategies to mitigate traffic impacts in lieu of increasing roadway capacity. The TDM Ordinance can provide a vital framework to link vehicle trip reduction to development and further climate action planning at the municipal, regional and ultimately, the state level.



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¹³ California Greenhouse Gas Emission Inventory: 2000-2016, bit.ly/2QMj1o5.



Interview

Michael Colella
Associate Director
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North American transportation infrastructure over two decades

Associate Director, Michael Colella, originally from New York, has returned home after spending 22 years in London. Given his experience working in both the U.K. and U.S., we asked Michael about the differences between the two and what challenges he sees for transportation in North America.

Q: Since you have been away from the States for over two decades, how do you compare transportation infrastructure and policy today to that of the 1990s?

A: I think nowadays there is a growing acceptance that transportation infrastructure, and infrastructure more generally, are much more important issues than they were perceived to be in the 1990s. Back then, transportation was important in some areas, but on more general terms and at a national level, people just got around and transportation was not a priority on the political agenda of the time. In Canada, back in the 1990s, they were disinvesting in transportation.

Fast forward 20 years and we start seeing a sense of urgency and appetite to do something in this arena. Since the Trudeau administration came into power in Canada, they have increased investment in transportation infrastructure. In the U.S., there is definitely a greater interest, and in key areas – Los Angeles, Seattle, Atlanta, Dallas, Houston, Denver – they are finding ways to generate income for investing in infrastructure improvement.

Q: What are the main differences between transportation in the U.K. vs. North America?

A: In the U.S., there is a clearer distinction between what the private sector does, such as running an airline, and what the public sector does, such as running a commuter rail service.

In the U.K., it is much more fluid. There is a sense that while transportation policy is ultimately a public-sector decision,

the development and delivery could be done by either the public or private sector. London is the best example of this, where Transport for London determines the types of bus or rail services or cycling policies, but most are operated and delivered by the private sector. This outsourcing remains limited in the U.S., and although some exceptions such as P3 toll road projects are happening, there is very limited involvement of the private sector in what is considered the public-sector realm.

Canada is similar to the U.K. For example, Toronto's Metrolinx determined what they wanted for the GO station expansion project but the private sector will develop, deliver and run the expansion.

Q: What are the challenges you see facing transportation into the future in the U.K. and North America?

A: I have found that the quality of infrastructure in the U.S. could use some improvements, however there are fundamental challenges – more money, investment and time – needed to deliver these. I think the country could benefit from finding a more effective and efficient way of delivering and maintaining transportation infrastructure involving the private sector.

In the U.K., the challenges lie in the growing population using infrastructure that isn't growing at the same rate and finding the funding to make the necessary changes that doesn't depend solely on general taxation.

Canada is somewhere between the U.S. and U.K. There is some infrastructure in Canada that has seen very little investment over the last few decades, though this is now changing. I think passenger rail could be playing a much bigger role, whether it is long distance commuting or intercity.

Q: Technology is constantly changing transportation as we know it. In your view, which technologies are having a bigger impact on the transportation sector?

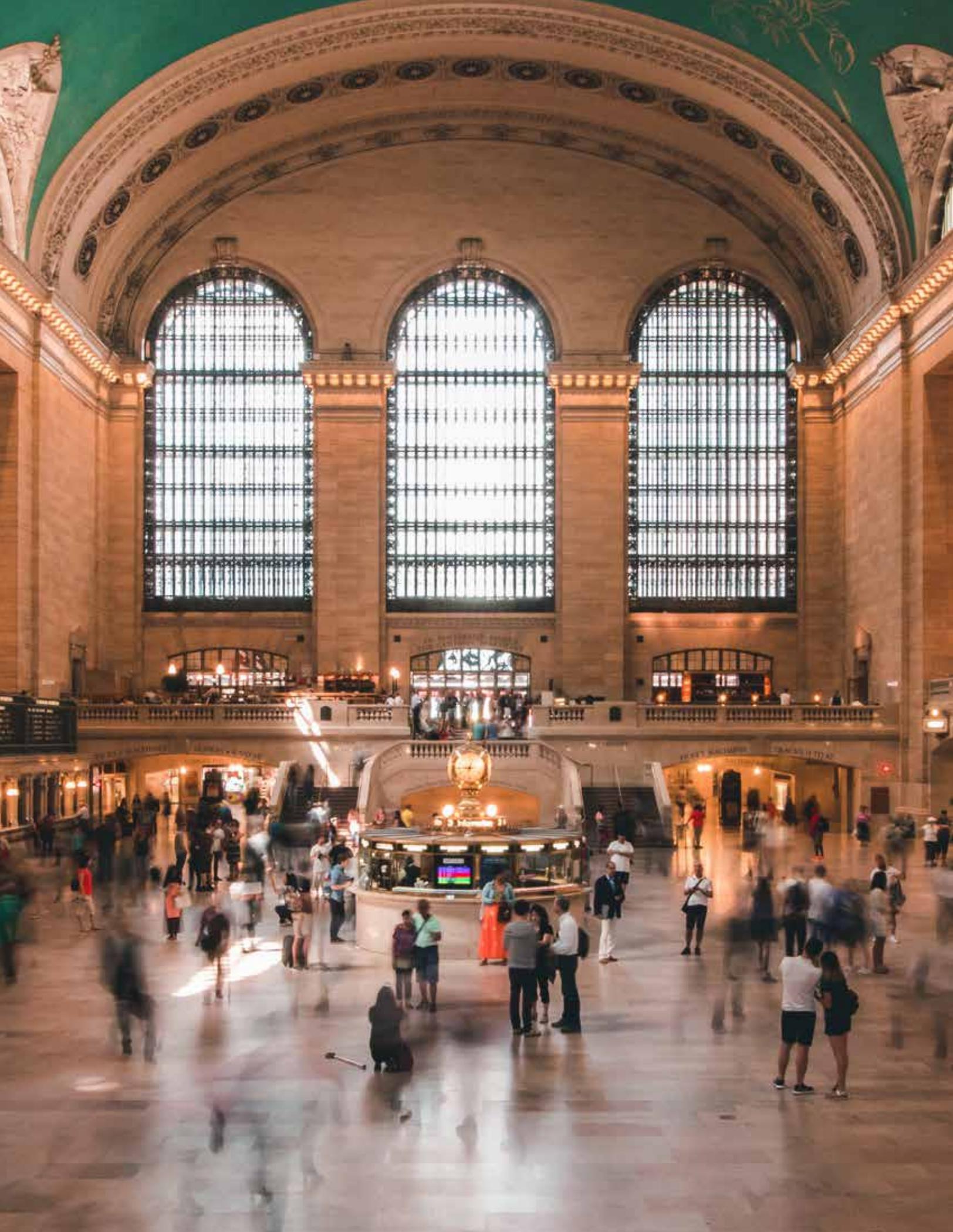
A: Many technologies have already had an interesting impact on the world, as we know. In New York, for example, services like Uber have had a pretty big impact on people's lives. Bike share programs have also had interesting consequences, allowing big cities like New York and London to have more extensive cycling infrastructure than 20 years ago. As existing infrastructure continues to struggle to deliver reliable services, some impact on demand could be expected, though I expect it to be relatively limited.

It will be very interesting to see how technology impacts a country like Canada, with a large rural population. I think rural communities could really benefit from some of the technologies that are starting to permeate.

Q: Steer works across the globe. Are there any transportation lessons or strategies being deployed in other countries or geographies that could be applied to the U.K. or North America?

A: I think bus rapid transit (BRT) and more flexible transportation infrastructure could play a much bigger role in North America, or even the U.K. The rise of BRT in Latin America – Brazil, Colombia, Chile and almost every country there – has been done partially because they didn't have the time to design and build big expensive metro or commuter rail systems. BRTs potentially represent a stepping-stone to metro systems in the future when demand, fares and costs are better understood. This approach of 'incrementality' is really something that could be leveraged further elsewhere.

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