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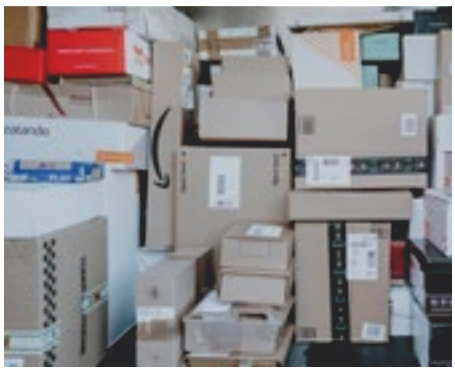

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Economic Impacts of Autonomous Delivery Services in the US

By Alia Verloes

Autonomous Vehicles will revolutionize last-mile deliveries

The use of Autonomous Vehicles (AVs) is enhancing the convenience and efficiency of last-mile delivery. AV technology, in combination with established online platforms, is facilitating new business models across retail and food delivery.

Delivery AVs can provide an effective solution to carry goods from local stores and restaurants through an on-demand, last-mile delivery service. These vehicles are equipped with lidar sensors, radar and cameras to monitor surroundings, and are designed to carry goods rather than people. Custom on-road delivery AVs, like Nuro's R2, are space-efficient electric vehicles, which are smaller than a standard passenger car. They are built to operate on urban and suburban streets.

Delivery AV services are emerging as one of the first commercial applications for AVs in the United States (US). The use of delivery AVs for last-mile delivery has the potential to accelerate demand for home delivery considerably.

For consumers, delivery AV services are expected to influence purchasing behavior, reducing the need to drive to stores. Increased use of delivery services will be encouraged by an improved consumer experience and lower prices. While existing grocery delivery services add $10–201 to the cost, initial delivery AV pilots have cost $5.95, and Nuro aims to reduce the delivery cost to $0 for the consumer, providing a more broadly accessible service.2

For the retail sector, delivery AV services could be transformational, offering abroader range of opportunities, leading to lower delivery costs and greater demand for on-demand delivery offerings.

Car manufacturers and tech companies are investing in this future in partnership with retail players such as Kroger, Walmart, Domino's and CVS Pharmacy. This has led to an increase in the number of delivery AV pilots in recent years. Delivery AV services work like this:

- Customers order groceries or other products online from one of the partner stores.
- Items are picked and packed in store and brought to a waiting delivery AV.
- A notification lets customers know when their delivery has arrived.

- Once the customer has unloaded and accepted the goods, the delivery AV vehicle drives on to the next customer.

Context of this Commission

Over 85% of trips in the US are currently made by private vehicles, which adds to significant traffic congestion, collisions and transport emissions, particularly in cities and urban areas. The use of electric AVs for deliveries has the potential to reduce congestion, collisions and transport emissions. In addition, delivery AV services can batch multiple customer orders. Compared to customers driving themselves to the store, this generates additional potential benefits through reductions in overall Vehicle Miles Traveled (VMT), lower transport emissions and user time savings.

In this context, Nuro has commissioned Steer to conduct an independent study to evaluate the potential economic impact of delivery AV services to the US economy by analyzing the following:

- Role of delivery AVs in reducing personal vehicle trips (estimating overall market potential for delivery AV services between 2025 and 2035 at a national level and for selected states);
- Economic impacts of delivery AV services for the US economy, including employment impacts; and
- Wider impacts of delivery AV services, including safety, emissions, and time savings at a national level and for selected states.

Why it's important to consider the economic impacts of delivery AVs

Replacing private vehicle trips to go shopping and run errands with delivery AV services could create a significant economic opportunity. This impact differs from the economic impacts of AV passenger services because on-demand goods delivery is a less mature service that has been limited to date by price in the US. A lower-cost delivery service enabled by delivery AVs could lead to significant growth in demand for last-mile delivery.

The technology for delivery AVs could also emerge earlier than for passenger AVs as these vehicles do not require balancing occupant safety and comfort with other road user safety, they may have more prescribed operating areas because they do not have to account for passenger expectations, and surveys3 indicate higher levels of public trust for goods-only AVs.

Delivery AV services are expected to create an increase in demand and employment opportunities amongst retailers (who must hire pick-and-pack workers for trips where the consumer previously packed their own order) and in industries that supply raw materials and inputs to delivery AV services sector such as vehicle manufacturing, technology, supply chain companies, etc.

In addition, the relative emergence of services like grocery delivery (approx. 3% of groceries were delivered prior to COVID-19) mean that while existing workers will be affected, there is less potential for disruption to an existing workforce.

A successful transition from conventional vehicles to using delivery AVs would require significant support from both consumers and regulators. Quantifying the potential benefits of introducing delivery AV services to the US economy provides an informed basis for regulatory reform to enable wide scale adoption of delivery AV services.

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Is COVID-19 a temporary or lasting remedy for our 'freight blindness'?

By Fiona Jenkins

From 2018 to 2019, I worked at the National Infrastructure Commission on the Future of Freight study. I was privileged to be part of the team that delved into the detail with the freight industry, consulted with central, sub-national and local government, engaged consultants, and ran the analysis on everything from whether wharves are adequately safeguarded to what proportion of parcel deliveries could be made by drone. The final report, "Better Delivery: the challenge for freight", includes the Commission's recommendations to government on how the UK's freight system should change, so it continues to keep pace with the world around it.

In the Commission's interim report we accused everyone – government, local authorities, planners, the general population – of 'freight blindness', suggesting that, because we often do not 'see' the freight system in action, we are not placing sufficient value on the things that an efficient freight system needs to work well. How times have changed. The freight sector is currently engaged in heroic, wartime-like operations to keep us fed and watered, and we're applauding the efforts of delivery drivers from our windows and balconies. Despite the fact that we still don't fully understand how supermarket shelves are stocked and deliveries arrive at our doorsteps, we're at least moving away from taking it for granted.

I'm interested in some of the emergency measures that have been brought in to help optimise supply chains in this time of crisis. One of the first I saw was the relaxation of restrictions on when supermarket deliveries could take place, allowing more deliveries overnight, and stock to flow more quickly from warehouses to shelves. Local authorities set these restrictions to protect sleeping residents from noise disturbance, but different restrictions apply in different streets, with many outright bans on overnight deliveries. This means that supply chain managers have to navigate a complex web of rules to run operations overnight when the roads are far less busy. As these rules are set at a local level, a coordinated approach to the relaxation of overnight restrictions was previously in the 'too difficult' pile.

Local residents will be more tolerant of any overnight delivery noise while there's still a risk that supermarket shelves could run empty, but if the relaxation of restrictions continues to apply for a short period once we return to business as usual it will be useful to see where residents are genuinely affected by noisy deliveries and navigate accordingly, rather than wholesale return to the current system.

I've also seen reports that with the railways operating a significantly reduced passenger service there's the opportunity to carry far more rail freight. By early April, freight operators were running longer trains: one advantage over road haulage is that they require far fewer drivers and are able to maintain a reliable service even if some drivers are self-isolating.

When I was working on the Freight Study at the National Infrastructure Commission, we knew that capacity for passenger services was untouchable, and that the rail freight sector had to negotiate hard to receive a fraction of the paths it wanted. We can't

be sure how passenger travel demand will change as a result of the COVID-19 crisis, but if we consider a situation in which people travel less overall, less frequently and for shorter distances than they did before, it may be that there is more capacity on the railways for freight.

Air freight normally contributes to disaster relief because it is the fastest way of delivering life-saving materials. In the past, this has included tents, clothing and food, but in the current crisis, the focus has been protective clothing and medical equipment. Normally, most air freight at Heathrow arrives in the belly holds of passenger planes, but in their absence, there has been a massive increase in the number of dedicated cargo flights, from an average of 47 a week to as many as 38 on a single day. In addition, some passenger aircraft have been used to provide additional capacity. The NHS and the Department of Health chartered a Virgin Atlantic Boeing 787 to bring over 750,000 items of personal protective equipment (PPE) from Shanghai, stowed in the hold, on seats and even in the overhead lockers.

Despite these rapid adjustments to deal with immediate and urgent needs, we must not lose sight of the decarbonisation challenge – the climate crisis is neither solved nor on hold. The Commission calls for a "clean freight revolution", with a recommendation that the pathway to decarbonised road and rail freight is mapped out within the next couple of years, with both to be zero carbon by 2050. It is simply too early to make a call on what future technology could deliver – but, as the Commission argues, it's imperative that we start tackling issues now. New infrastructure takes years, if not decades to deliver.

Like everyone, I'm fascinated to see what the new 'normal' will look like once we are on the other side of lockdown. I'm hopeful that COVID-19 is the trigger for a new acknowledgement and respect for the freight system and a significant step towards an understanding of what is needed from government, local authorities and planners to support it as it continues to deliver for us all.

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Forecasting in uncertain times: What can we learn from studying 100 toll roads in India?

By Serbjeet Kohli

As we enter an uncertain period for the Indian toll road market, it is important to look back to the past to see what occurred when the nation's economy had been rocked.

Since our Delhi office opened in 2016, we have studied more than 100 toll road assets in India. Traffic and revenue forecasting for toll roads has always been Steer's core strength and this was our primary objective when the company decided to focus on the Indian market. With nearly 500 individual operational toll roads in India, each of approximately 100km in length, and a broadly equal split between government-owned and under concessions, the market was immense. Little did we know that we would have to relearn a lot of what we had been doing for nearly 35 years all over the world.

The toll road market in India had gone through one cycle of boom and bust in the period 2007/8 to 2011/12 and a new government had come in, which was starting to focus on restarting the infrastructure investment programme, with emphasis on road investment. There was, and still remains, a lot of stress in the existing assets under concessions. During the boom cycle, various bidders (developers as they are called in India) had been over-optimistic with their traffic projections. The National Highway Authority of India (NHAI) - primary grantor of these projects - had underestimated the hurdles it would face in getting the necessary clearances. In particular, land availability was a key bottleneck, and public banks lending to these projects had not carried out much due diligence to understand the risks involved. In summary, whatever could go wrong, went wrong.

This created an opportunity for some new age investors such as international pension funds and infrastructure-focused funds, who had started to look at the Indian market. This continues to be the case, as the domestic lending institutions are still under significant stress. These new investors needed a more rigorous assessment of the revenue and cost risks that they were taking on when investing in such assets.

Having worked with most of these investors elsewhere in the world, we understand what their investment committees want to know when considering investment in Indian toll roads. Our promise to them was and continues to be – we will deliver the same quality of service and products here in India as we have done all over the world. Easier said than done!

Below are key findings we have collated over the past four years after working on more than 100 toll road assets:

Every year is a shock year: This could not be truer now more than ever, with the entire country in lockdown mode, and the tolling on national highways being suspended for 21 days due to Covid-19. With demonetisation (ban on 85% of currency in circulation) in 2016, introduction of a new national

good and services tax (GST) in 2017, change in axle load norms (allowing new and existing trucks to carry 25% more loads) in 2018 to the significant slowdown in the wider economy leading to collapse of truck sales (partly linked to a liquidity crunch created by failure of a major shadow bank) in 2019 – no year is a normal growth year in India. Good news is, traffic bounces back quickly as new travel patterns emerge.

Data isn't always what you expect it to be: With various levels of maturity of reporting standards, understanding what the traffic and revenue data available from toll plazas actually means can be a challenge in itself. In addition, the inability of toll operators to explain the errors/issues in the data, or any specific historical events, makes it even more difficult to forecast such similar events in the future.

Traffic times Toll Rates does not equal Revenue: Ticket prices vary, which means not all traffic users pay the full (or single) toll rates, and a significant proportion of light vehicles are exempted. In certain cases, the toll operator provides concessions not mandated in the concession agreement to certain local users as a pragmatic approach to revenue maximisation. Understanding only traffic growth is not enough in the Indian context. How the ticket types, trip frequencies and trip rates change in future years will also impact revenue growth.

Trucks generate nearly 70% of revenues: Toll rates for large trucks are nearly 4.5 times toll rates for cars. The inter-urban nature of toll road network, and significantly higher trip lengths of trucks, means that they generate the majority of the revenues on toll roads. As a large proportion of India's population has no car ownership, the car ownership levels, (<100 per 1000 people) are relatively low as compared to developed markets and, more importantly, long distance (>100km) travel by car is still a small proportion of the overall travel market.

GDP growth remains a key driver of traffic growth: However, understanding commodity drivers and their linkages with GDP growth becomes a key aspect of forecasting. Agricultural-focused commodity corridors are growing half as fast as GDP, whereas industrial or port-focused commodity corridors are seen to grow at a similar pace to GDP.

Network impacts are big drivers of growth compared to GDP: As the country expanded the network from 5,000km to 50,000km from the 1990s to the 2010s, the availability of alternate/feeder routes has become a key determinant of traffic growth or decline. Wide variation in year-to-year traffic growth has been observed on various toll roads, as new alternates or feeder corridors have emerged. Aggressive plans and progress with new expressways show the potential to provide a much-improved level of service, apart from changing the network behaviour in new and unseen ways. A clear understanding of how the network is evolving becomes a key input into developing forecasts for any toll road section.

Regulatory changes can have significant influence on demand: Regulatory changes have come about thick and fast. From bans on specific mining commodities (coal, sand, iron) to changes in overloading penalties for trucks, to introduction of compulsory use of electronic tolling (FasTAG), which result in significant shifts in truck flow patterns and the yields at individual plazas.

Small variations in GDP could mean large variations in traffic growth: Due to the elastic nature of truck traffic growth, small variations in GDP growth results in a significant variation in truck traffic growth. In the growth period when GDP is faring well at around 6-7% growth rates, traffic is seen to increase at 10-12% growth rates. However, when the GDP slows down to a 4-5% growth rate, traffic is seen dropping down to 0% or even negative growth rate, particularly in industrial corridors.

The variation is relatively smaller on agricultural corridors.

As ever, traffic and revenue forecasting remains a challenge, even more so in a dynamic economy as India. The lessons we have learnt here, help us deliver more informed views to the investors in order to assess the risks involved in such investments. Each project risk brings its own flavour. While we believe this is an industry where we will be learning every year, the added knowledge we have built upon yearly, make us well poised to face these challenges in the future. We look forward to continuing on this learning curve, and being part of the transformation that the toll road market in India is going through.

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Steer wins the 'Innovative ways of working' award at the ENEI Awards 2020

We are extremely proud to have won the 'Innovative ways of working' award at the ENEI Awards 2020.

The ENEI Awards recognise the commitment of organisations in achieving diverse and inclusive workplaces and celebrate the teams and individuals who are really making a difference.

At Steer, we support our employees, who are from a range of different backgrounds, with their personal commitments to achieve a good level of work-life balance. We believe that being an agile and innovative employer is key to maintaining our strong working culture.

The future of US aviation policy series: The public to the rescue, but for how long?

By Stephen D. Van Beek

COVID-19 continues to pose an existential threat to aviation globally and to the U.S industry. Less discussed, is that it has also brought forward questions about the sustainability of funding and today's support of key parts of the system, including air traffic control and airports. Over the next few months, Steer will be discussing these issues and posing alternatives to address them. Now is the time to begin consideration of reforms that will help expedite recovery and return aviation to its important role of driving economic growth as well as connecting people and businesses to national and global markets.

During these unprecedented five-plus months of misery for the aviation industry, the public nature of the U.S. aviation system has arguably worked to the advantage of agencies, users, airlines and airports; policymakers have tapped billions in general fund dollars to provide record levels of relief to aviation's principal stakeholders. This is in stark contrast to almost all other nations where relief has either been limited or unavailable (as I write during the congressional recess, there remains an additional opportunity for aviation stakeholders to receive additional financial support).

The reason for these differences is that many other nations over the last three decades have removed their aviation service providers from public operation and control. Nations, including Canada and the United Kingdom, have created various forms of commercial entities, including Air Navigation Service Providers (ANSPs), handling their nation's commercial and private air traffic; whether non-profit or private entities, these ANSPs operate on the principle of cost-recovery, charging users for services and investing in the capital and operational resources required to provide these services.

In addition, many of the same nations, including the nations within the European Community, have financially deregulated airports, giving them rate-setting authority for passenger service charges (the equivalent of our Passenger Facility Charge PFC) and more freedom on aeronautical rate-setting. With these commercial principles, these nations have effectively eliminated public responsibility for capital funding, encouraging private/commercial ownership, operation and control of airports.

The United States, in contrast, remains a public system—the FAA owns and operates air traffic control, and the overwhelming majority of airports are operated by state and local governments. Airports work within a tightly circumscribed set of economic regulations in exchange for capital funding provided by the Airport Improvement Program (AIP), which allocates funding for airports of all sizes--from those that serve general aviation and private users to the busiest commercial service airports. Even with the U.S. airlines, which have been ostensibly deregulated for over 40 years, the federal government has stepped in to provide billions of dollars of assistance after the 9/11 attacks and during the COVID-19 pandemic, in ways that their global counterparts can only envy.

The U.S. FAA programs have been funded by the Airport and Airway Trust Fund (AATF), which derives its revenues from taxes and fees assessed on system users, and on average about 20% of taxpayer funding--although in recent years it has varied considerably around that average. With the passage of the CARES Act, Congress suspended those taxes and fees, which now means that the AATF is not being replenished and, with a recent drawdown of its uncommitted balance, does not have the support for its future obligations, including for air traffic capital and operations as well as for AIP.

Going forward, it is unlikely that taxpayers will continue to fully underwrite the over $15 billion annual public cost of aviation; as the economy recovers, the federal government will likely return to fiscal discipline, something understandably absent during the recent crisis. Several choices emerge:

- **Status Quo:** If the AATF is to play the historic role it has in supporting air traffic and airports, the taxes and fees must be re-imposed soon in order to begin rebuilding a balance to drawdown annual system costs. Undoubtedly, airlines, general aviation and cargo aviation will oppose early return of the taxes and fees, worried that they could discourage or burden their operations as they are beginning their recoveries.

- **Reform of the Public System:** Policymakers could consider reforming the taxes and fees, attempting to apportion the costs of funding the system to future users of the system; a thorough examination of the fairness, adequacy and economic effects of the AATF taxes and fees has not occurred in decades (the reason it hasn't, of course, is that the politics are very challenging, even though allocating costs is pretty straightforward).

- **Reallocate Roles and Deregulate:** Another alternative would be for policymakers to change how services are provided, including a commercial ANSP and deregulated airports. Public contributions could remain for those services that cannot fully pay for themselves, including remote and rural community air service as well as lifesaving and safety services.

- **Other Approaches?** While we are listening, we are eager to hear new alternatives offered by those in the industry.

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Back to school plans, but what are the implications on travel?

By Helen Bonner

The UK Government has announced that primary schools could start to reopen (to limited year groups) from 1 June and anticipates that all primary year groups can return a month before the summer holidays start.

For some time, schools will have been planning how they can reopen safely to pupils – setting out classrooms to ensure children can socially distance, carefully managing playtimes to reduce the opportunity for pupils to congregate, and staggering lunchtimes to allow children to safely sit apart.

But what about the possible implications and impacts of schools reopening on travel to school?

Public policy over many years has focused on encouraging sustainable and active travel to school – encouraging walking/scooting and cycling to address inactivity and child obesity issues, help tackle poor air quality around schools, and address congestion and associated safety issues at the school gate.

Surveys during the lockdown hint at people's unwillingness to return to public transport because of concerns about crowding and the difficulty of achieving social distancing; indeed, the Government is now advising people to avoid using public transport. One concern is that if parents start to drive to work this could lead to an increase in car use for the journey to school as they drop off their children on the way. The impact of this on schools will be huge – with additional congestion around schools and associated negative impacts on safety and air quality. Pre-COVID, school run traffic typically accounted for one-fifth of peak time vehicles on the road; with more people driving to work as the lockdown eases it will be even more important to remove short, local school travel journeys from the network.

Schools will need to:

- Advise parents on safe routes for walking and cycling to school, possibly proactively managing walking and cycling onto specific routes to spread demand and help support social distancing.
- Increase the space available at school gates for people arriving on foot and by bike, and perhaps introduce new 'in' and 'out' gates to help parents keep their distance.
- Introduce staggered school start/finish times to help spread numbers at school drop off and pick up, perhaps giving parents a specific timed start and actively discouraging any lingering.
- Have sufficient space at school site to store pupils' bikes safely.

Local authorities have an important role in:

- Helping with back to school travel planning and liaising across schools to agree staggered school start/finish times to help manage travel demand across the wider network.
- Quickly introducing practical infrastructure measures around and on routes to schools to create safe space for walking and cycling to school – widening pavements, creating 'school streets' where traffic is restricted, safeguarding existing (or designating new) cycle routes.
- Ensuring that these new measures can support walking and cycling over the longer term.
- Supporting coordinated efforts on school bus services as operators deal with social distancing requirements and schools seek to stagger start and finish times.

Families are walking and cycling together more, encouraged by much quieter roads (retailers have reported significant increases in bike purchases and there has been a boost in the take up of cycle to work schemes). More people than ever before are working from home and will be discovering the additional time that this creates in their working day. These things could mean that parents are more willing and able to cycle or walk to school with their children. Walking and cycling to school is not issue-free and it won't just happen by itself – parents are looking to schools for reassurance that back to school plans have been properly thought through and want straightforward guidance about what to do and how to do it safely. Schools and local authorities will need to work together to help guide parents and pupils to make good, safe travel choices.

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How behavioral insights can help us to predict and influence the return to work

by Simon Hollowood

Now we're past the peak of the Covid-19 pandemic and starting to think about life post lockdown, two questions are, "how quickly will people return to work?", and "what will the 'new normal' way of working look like?". Since everyone has seen the benefits of less traffic, we might also ask "can this be made part of the new normal?". Just as science has helped to minimize the impact of Covid-19, behavioral economics and the insights gained from it can now help with us with predicting and influencing what happens post-pandemic.

One thing is for sure, Covid-19 has stirred up the status quo and broken people's travel habits, making them more susceptible to being nudged towards a more active and sustainable lifestyle. On the other hand, a new habit has been created involving keeping at least 2 meters apart: this is clearly not conducive to the use of public transport and is an inducement towards more single occupancy car travel.

Given the behavioral effects[1] at work such as Status Quo Bias and Herd Behavior, the return to a new normal could be quite protracted and could end up being a relatively unsustainable car-dominated future. However, having experienced the benefits of a relatively traffic-free environment and other positives such as an increased sense of community and belonging, the Endowment Effect suggests people will be open to trying not to lose some of the benefits of lockdown.

A challenge for anyone looking to speed up the return to normality, while also ensuring that the new normal is an improvement on the old one, is that everyone's situation will be different. Some will be itching to get back to work and be in contact with friends and colleagues, others will be fearful of breaking social distancing rules which are now ingrained.

Attitudes towards different forms of transport will also vary widely. Some may have used their bicycle for their daily exercise during the lockdown and may be ready to try cycling to work, some may need some support to help them get back to using the bus, tram or train, and some may be looking to see how they can continue to reduce their need to travel by having virtual meetings. In fact, undertaking activities in a virtual rather than physical world is one potentially positive legacy of Covid-19 and Steer has been able to take advantage of a new acceptance of doing

things online to progress projects that otherwise would have stalled, such as virtual consultation events, virtual council planning meetings and virtual one-to-one employee engagement.

We are now seeing that personalized one-to-one conversations undertaken via online video can be a way of helping companies speed up the return to work while doing so in a way in which maximizes active and low carbon travel. This new normal way of undertaking travel planning activities we are calling Virtual Travel Planning (VTP) and this brings together three key elements: individualized travel information, motivational interviewing techniques, and behavioral insights.

This means that our travel advisors are trained in motivational interviewing and in the various behavior change techniques associated with known behavioral effects such as Status Quo Bias, Herd Behavior, the Endowment Effect, the Desire to Belong, the Need to be Empowered along with many others. Since the conversations are one-to-one the advice can be tailored to the needs, constraints and preferences of the individual.

To find out more about Virtual Travel Planning and how it can be used to help the return to work and to encourage the use of active and sustainable travel modes contact Simon Hollowood.

[1] The behavioral effects referred to here are all well-established effects or biases coming from the field of behavioral economics, also sometimes referred to as behavioral science or, more colloquially as nudge theory.

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Harnessing Big Data to solve mobility issues

By Lucile Kellis

One of the keys to improving transport efficiency is reliably predicting demand for travel, which is influenced by the state of the economy, consumer behaviors, and many other interrelated factors such as weather, politics or global health considerations. Machine-learning models trained with large amounts of historical data can help predict when and where demand will be high or low. More efficient operation, in turn, minimizes unnecessary spending.

The democratization of technology, progress in machine learning techniques, and data availability have converged toward a new era in demand forecasting. Machine learning can be used to develop more powerful predictive models that accurately predict when and under what conditions disruptions will occur. It is also used to recognize, in large datasets, long-term patterns that traditional methods could not process. Facility operators and policy-makers alike can use these insights to stop upsets before they start; to develop strategies to respond to them more quickly, such as during a pandemic; or to develop 20-year-horizon strategic plans that address the underlying behavioral patterns uncovered.

As a most recent example, the COVID-19 pandemic has impacted travel and mobility behavior in major ways, impeding our ability to assess 'normal' patterns. More problematic yet is understanding, with the goal of modeling what the 'new normal' will be.

Our traditional assumptions to assess travel behavior must be modified to recognize both the short-term mobility pattern disruptions and the longer-term shifts in travel behaviors and business practices. But how?

Machine learning tasks fall within two major categories: supervised and unsupervised. In supervised learning, the goal is predicting the label (classification) or response (regression) of each data point, by using a provided set of labeled training examples. In unsupervised learning, such as clustering and principal component analysis, the goal is learning inherent patterns within the data themselves. The large amount of data generated by location-based services (LBS) cellphone apps lends itself to both types of analysis. Regardless of the method, data analysis and pattern recognition have allowed the development of much more powerful predictive models than previously possible, which can be used to forecast the behaviors of travelers without making too many assumptions about their behaviors, such as they are a 'rational economic man'.

How can Big Data and AI technologies help us with current issues and future mobility planning need?

Both short- and long-term impacts can be measured using real-time big data and mined via machine learning techniques. These are able to process a vast amount of seemingly unrelated data, and help support decision-making processes, both in time of crisis and for planning purposes.

In the short-term, passive data providers such as Streetlight and INRIX are playing an increasing role in both providing historical data and real-time traffic comparison and monitoring. They have proved useful to transportation planners in providing traffic data

and uncovering travel patterns that would have been extremely difficult to uncover otherwise. For example, short-term disruptions have deeply affected demand for all areas of transportation during the pandemic, with most transit agencies operating at unprecedented low levels. Auto traffic dropped significantly, public transit ridership hit dismissal levels, and air travel has been almost halted. Traditional approaches to demand management could not help operation managers and emergency policy-makers face the crisis, but the analysis of real-time demand data within each service line allows operations to be adapted to fluctuating demand and policies to be implemented that respond effectively to observed behavioral changes.

In the long-term, increased reliance on scenario planning and risk analysis have been advocated to account for a larger spectrum of possible futures. These may include driverless cars, annual pandemics, extreme weather conditions and other unpredictable external factors. AI can help by providing powerful methods to synthesize future scenarios into manageable futures.

During the COVID-19 pandemic, demand has been suppressed globally for most transport systems. While some of those behavior changes are short term, others may have long-lasting impacts on transportation demand:

- a larger part of the workforce working remotely, more often, resulting in less commuting, with reduced peak congestion and reduced public transit demand during peak hours;
- increased online shopping and eCommerce in general, fostering increases in small to medium truck deliveries, with long-term shifts in freight delivery patterns;
- a reduction in global travel as personal and business travelers alike consider more carefully how much and how they travel, affecting airlines, regional rail and high-speed rail operators;
- a shift in business practices, including reducing the number of physical offices, shifting entire offices to working remotely, as they are cutting costs; or
- mistrust in public spaces and public transport – bus, metro, subway, regional and high-speed rail – with a shift toward personal vehicles, with potentially more intercity car travel.

The main issue is how different the 'new normal' will be from pre-pandemic conditions, whether a reduction in overall travel demand or a more nuanced shift in travel modes and patterns. There is a need to assess the likely behavioral travel pattern shifts to measure better the potential long-term impacts of a pandemic on transport demand. What will the 'new normal' be like, and what will be the consequences of the pandemic for business and personal travel and for mode choice? Traditional transportation planning tools fall short in providing the necessary support to planning agencies in uncertain times, but such behavioral questions can be tackled, using a combination of behavioral surveys and real-time location data. Machine Learning techniques can uncover underlying patterns or trends, using the millions of LBS data collected in real-time and over a period of time.

In the past few years, mining big data has helped Steer better understand the social, economic and environmental drivers of demand. Data mining of LBS data has proven insightful in many projects at Steer, including new mobility strategies; Transportation Network Company (TNC) support; infrastructure and services for toll road operations; city operations and urban planning for public space planning; state and corridor planning for regional rail forecasting; sporting and cultural events; and people and places.

Beyond using state-of-the-art data forecasting approaches and cutting-edge machine learning algorithms, transportation policy decisions play a central role in shaping the cities of tomorrow. Here again, and perhaps most importantly, AI can help, providing decision support to policy-makers faced with limited resources under increased uncertainty.

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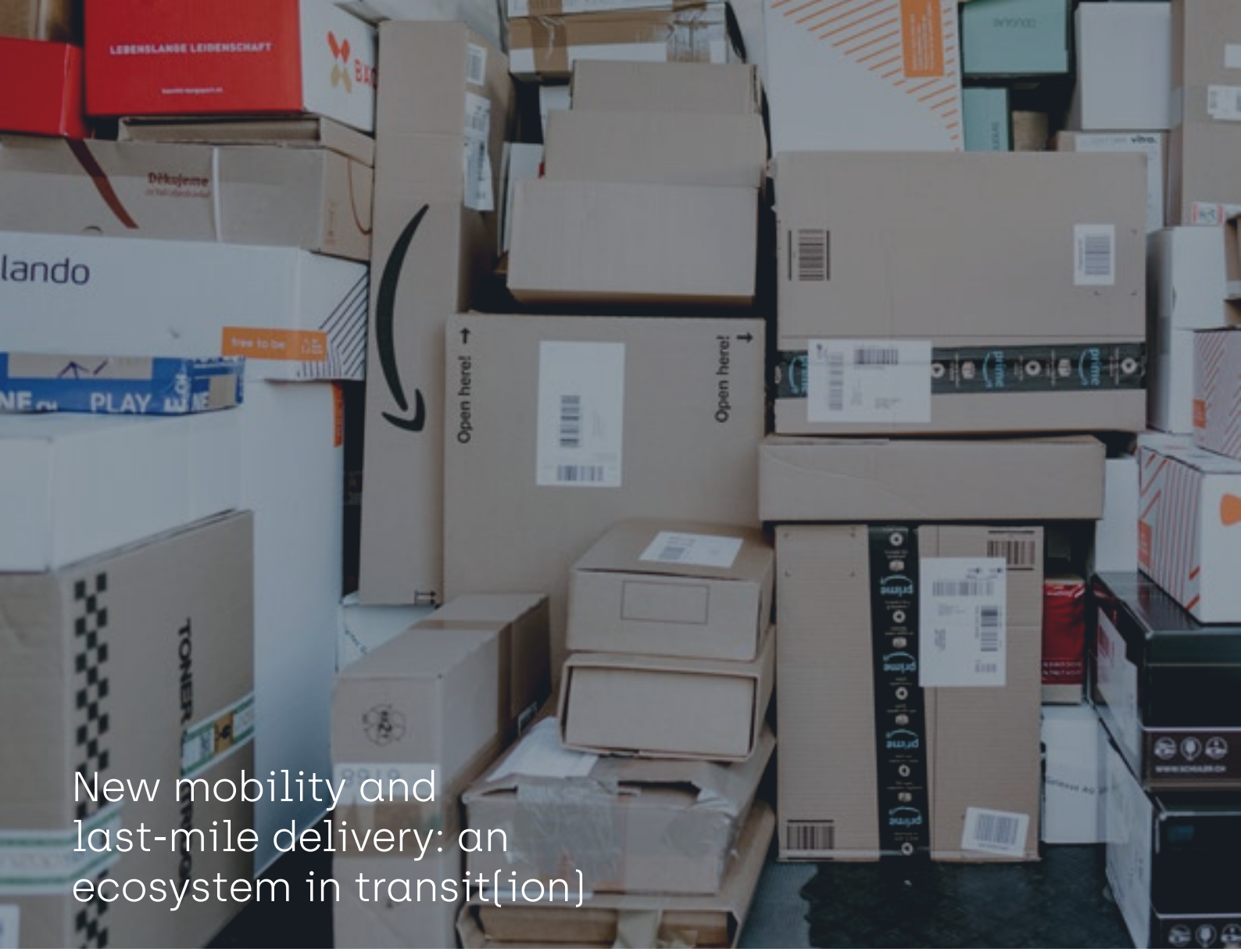

New mobility and last-mile delivery: an ecosystem in transit(ion)

By Alia Verloes

The widespread use of online sales and associated consumption practices is leading to an increase in deliveries, transforming the very fabric of major cities around the globe. In New York City, it is estimated that nearly 1.5 million packages are delivered daily[1], creating pressure on the network. Against this backdrop, consumers' expectations for shipping continue to rise.

Consumer satisfaction can depend not only on the product itself but also how is delivered. Traditional delivery services have developed to include increasingly rapid delivery services – same day or in less than two hours, such as Amazon Prime Now – that significantly reduce the waiting time between purchase and receipt. These changes have raised customer expectations, with potential buyers more sensitive to delays, the high perceived price of delivery, and hourly constraints.

These new demands come amid recent last-mile technology development acceleration in the United States. Consumer demand for shorter delivery times is leading to the development of new services. These can be split into three categories: aerial delivery drones; last-mile or even 'last-yard' wheeled robots that roam sidewalks and deliver to homes or apartments; and autonomous vehicles for the road.

These include standard self-driving cars by Toyota, GM, Ford and others, and unique bot-like vans such as Udelv and smaller prototypes from Nuro or Robomart. Major retail players, including Walmart and Kroger, are investing heavily in technology and capabilities that anticipate significantly more online ordering and delivery.

Some companies in the automotive and transportation ecosystem already recognize this future, seeing that delivery through autonomous vehicles could have significant benefits and could be transformational for the industry, in particular as they relate to the last mile, which is usually the most expensive part of the delivery. Autonomous vehicles could significantly reduce delivery time and cost for many consumer goods, while addressing congestion issues and other transport challenges such as emissions, congestion, road accidents or continuity of delivery during a health crisis, such as we are currently experiencing. The key factor determining how fast this all happens will be the extent to which commercial, and to a lesser extent public, demand presses governments and regulators into action.

Today, we are seeing not only experiments with emerging technology – wheeled robots, drones, droids – across the globe, but also the beginning of series

production and scaling of service deployment by several companies from the OEM sector, retailers, or new self-driving tech startups such as AutoX, Nuro and Udelv. These developments appear challenging because they are not linear, but rather interlace in complex ways that add to their speed and magnitude.

As this sector continues to evolve, especially in the light of the current health crisis, Steer is staying close to developments, and advising players at the forefront of the industry. Our New Mobility team is well-positioned to help our broad range of clients from local and regional authorities to tech companies. Our experience includes monitoring and assessing how these changes can be tailored to maximize the positive impacts on their communities and businesses through tools such as market analysis; tailored business case analyses; economic and strategic evaluations; feasibility studies; stakeholder engagement; and monitoring and evaluation.

1 https://www.nytimes.com/2019/10/27/nyregion/nyc-amazon-delivery.html

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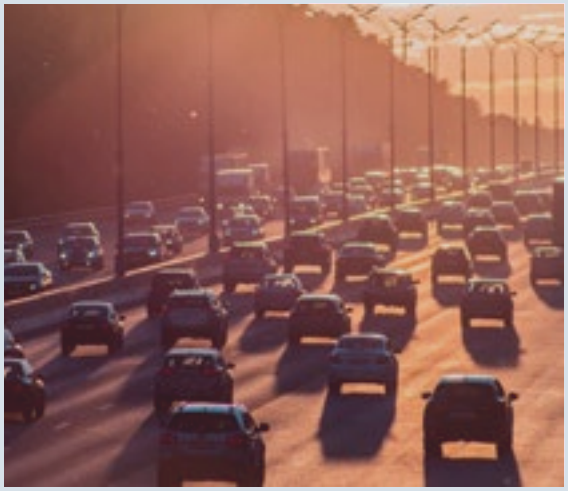

Steer provides traffic and technical due diligence services to the successful bidder of Brisa acquisition

On 28 April 2020, our client APG Asset Management-led consortium entered into an agreement to acquire an 81.1% majority interest in Brisa for an equity value of over EUR 3bn. The consortium includes the National Pension Service of the Republic of Korea (NPS) and Swiss Life Asset Managers.

Brisa is a leading European toll road operator, with a network of 21 motorways in Portugal held through several concessions with a total length of over 1,500km.

Steer provided traffic and technical due diligence services to the consortium in proactive collaboration with the financial advisor (Deutsche Bank). The delivery of combined traffic and technical due diligence services provided unique synergies to our client and their process, with a deep understanding on how the varying levels of traffic and heavy traffic may impact on the operation, routine and heavy maintenance of the road concessions.

For more details, visit: https://www.steergroup. com/insights/news/steer-provides-traffic-technical-due-diligence-services-successful-bidder-brisa

Commissioned to develop Oxfordshire's COVID-19 Economic Recovery Plan

By Simon Pringle

Steer Economic Development has been commissioned by Oxfordshire LEP (OxLEP) and partners from a senior stakeholder Task Group (including Chief Officers from Oxfordshire's six local authorities, senior representatives from the University of Oxford and Oxford Brookes University, and the Oxfordshire Growth Board) to oversee the development of a county-wide COVID-19 Economic Recovery Plan (ERP).

Due to the immediate economic challenges created by the pandemic and the disruption caused to employment, trade and supply chains in specific parts of the economy, the ERP has a near-term timeline, focusing on an immediate response and recovery period of 24 months.

The outputs from this project will be a Baseline Assessment Report and a subsequent Action Plan which aims to maximise existing activities and introduce additional responses to regain the pre-COVID-19 growth trajectory for the County and its localities.

The project has the following workstreams:

- An assessment of key socio-economic indicators prior to and, where possible, after the start of the COVID-19 pandemic, to understand the impact caused by the event;
- Econometric modelling (provided by our partners Cambridge Econometrics) to project the impact that COVID-19 will have on the economy of Oxfordshire in relation to the rest of the UK, by running a baseline projection and then an updated projection accounting for economic disruption caused by COVID-19;
- Insights on the current and anticipated challenges posed by COVID-19 from 50 key business leaders and stakeholders in eight themed Focus Groups, covering the Visitor Economy, Town Centres, Green Growth, Rural Economy, Strategic Sites and Assets, Inclusive Growth, Business Growth and Supply Chains, and Jobs and Skills;
- Collation and review of existing and pipeline activities that could be included in the ERP; and
- Development of a coherent and ready to deliver Action Plan formed around extent, pipeline, and new projects to enable the LEP and partners to maximise the speed and scale of Oxfordshire's recovery; and
- Six new funded projects, focused on COVID-19 recovery across target areas, are to be developed to complement extent and pipeline activities, with coaching provided to progress these from concept to application.

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Steer visualises London Cycle Hire trips during lockdown

By Matthew Clark

During the peak of the COVID-19 pandemic, public transport use plummeted and London, like many UK cities, is still experiencing reduced ridership due to ongoing personal distancing measures.

As UK cities plan to exploit the Department for Transport pilot for shared eScooters as one way to help relieve crowding on public transport, Steer took the opportunity to analyse how Transport for London's Cycle Hire scheme, celebrating 10 years in operation this summer, performed through the peak of the crisis for both leisure and essential travel.

Originally launched in central London in July 2010 to relieve capacity constraints on the London Underground network, the scheme has since expanded across inner London with plans for further expansion. As more Londoners choose to use bikes for both leisure and essential travel, Steer has analysed TfL's open data for Cycle Hire comparing trips from January-May 2019 to January-May 2020.

You can view the study here: https://covidcyclehire.steergroup.com

Key findings from the study include:

- Demand for Cycle Hire in London during lockdown has remained high.
- Despite lockdown, demand for Cycle Hire trips were higher in May 2020 than in May 2019.
- There were almost 66,000 Cycle Hire trips on Tuesday 26 May 2020, more than twice the May 2019 daily average.
- The average Cycle Hire trip duration has more than doubled from 20 mins in May 2019 to 42 minutes in May 2020.
- Leisure trips are changing the geographic patterns of demand for Cycle Hire with the top 10 cycle hire destinations in May 2020 being close to green spaces or the Thames.

In response to increased demand, TfL has already committed to expanding the geographic coverage of its Cycle Hire scheme and to expand the number of manned stations to help provide for demand.

Our analysis demonstrates strong demand for shared micromobility as a viable alternative to public transport for short to medium length trips. As urban areas around the world consider these alternatives to public transport, it is vital to ensure that all new schemes are planned to ensure the maximum public benefit for users, and to minimise any potential disbenefits (such as inappropriate parking).

Steer has supported the launch and development of bike sharing and shared micromobility solutions in London and in cities across the world, working with Transport for London, London boroughs, local authorities and micromobility operators.

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A decade of ferry demand modeling in the New York Harbor

The process for developing expansive demand forecasting models can be quite time- and cost-intensive. An effective way to balance this is by building a model in stages that mirror the steps many new transit services go through. Our team applied this process when developing the forecasting models used in the recent 2018-2019 NYC Ferry Expansion study.

As a result of the success of NYC Ferry's initial six-route system, there was citywide interest in further expanding the study and widening the ferry service to potential new landings and routes. The study presented the opportunity to implement another round of improvements to the demand models, which were initially developed in 2009 and updated in 2013. This most recent round of updates included the incorporation of GPS-based trip data, location-specific mode choice models, and the fine-tuning of model parameters based on the existing service and recent customer surveys.

While the updates themselves were fairly typical of periodic updates to demand models, they represented a significant jump in the model's capabilities. With these updates, the model was able to predict non-commuting trips, which allowed our team to forecast weekend, evening and tourism ridership. The original models were initially focused on understanding commuter demand, limiting their ability to forecast ferry demand for a wide range of trip purposes/ market segments.

The initial models developed in 2009 focused on forecasting commuter demand for ferries, which is a, if not the, key to understanding the viability of a new urban transit system. This is a practical way in terms of the level of effort, to develop only as much modeling capability as you need for assessing a service's feasibility. While focusing on predicting ridership for the core service, the initial model development included the time- and labor-intensive survey exercises required to develop the core behavior choice parameters. This step is often one of the costlier aspects of developing a mode choice model, so it was prudent to focus this first survey on the core commuter markets.

Following the initial model development and the initiation of the East River Ferry (ERF) as a pilot route, a more comprehensive planning study was undertaken in 2013, which included necessary model updates. These updates incorporated lessons learned from the first ferry service as well as an update to the underlying demographic and growth data. The models were also calibrated and validated against the known ridership of the ERF, increasing their accuracy. The 2013 study resulted in the implementation of NYC Ferry's first six routes.

Between the 2013 and 2018-2019 studies, a separate effort was undertaken to develop standalone choice models for Staten Island. This was as a result of Staten Islanders exhibiting different modal choice preferences than residents of other areas of NYC. These Staten Island models were also incorporated into the demand models used for the 2018-2019 study.

The decade-long process of periodic step-wise updates was an excellent example of how a core model can be developed as part of a potential service's feasibility study, and then be incrementally improved and expanded as a new transit service grows.

Andrew Haines
Chief Executive,
Network Rail

Delivering during and after the pandemic: Britain's railway network

We recently spoke with Andrew Haines, the chief executive of Network Rail – the publicly run organisation which owns, operates and develops Britain's railway infrastructure. We wanted to learn more about what makes him tick and the current challenges he's facing – not least of which is leading Britain's railways through the COVID-19 pandemic.

The social and economic impacts COVID-19 has had on people, businesses and industries across the globe are monumental, and the railway is no exception. Chief among Haines' priorities over recent months has been ensuring that Network Rail is able to run a safe and reliable railway that can get critical workers such as doctors and nurses to and from work, and move key freight goods such as medicine, food and fuel, all while providing a safe working environment for Network Rail's 41,000 strong workforce – particularly frontline employees – who have continued to carry out maintenance and upgrade work essential to operating the railway.

And that's before you consider everything else that has passed through Haines' desk. Making sure there are enough frontline staff to run the railway in the event of mass COVID-19 related absences, which fortunately did not materialise; amending timetables to meet demand where necessary; bringing forward maintenance and upgrade work where possible to make the most of increased track access; supporting a supply chain that is integral to operating the railway (such as bringing forward payment terms), and where possible aiding the frontline response to COVID-19 – some colleagues offered logistics and project management expertise to help deliver the Nightingale hospital in Manchester.

"I'm really proud of the industry's response to COVID-19," says Haines. "Collectively we've risen to the challenge, introducing new timetables in very short timescales, and finding new ways of working so that the majority of maintenance and upgrade work is able to proceed." He goes on to talk about the thousands of engineering projects that have been delivered in recent weeks. "If you look at Easter, we delivered £81.7m worth of work, in the early May weekend it was £84.7m, and over late May we're expecting to deliver £90m of investment. It shows how we've continued to support the economy and suppliers by investing in our infrastructure – in fact I can't imagine there are many others who have matched that amount in terms of investment. It's all about making sure the railway is at its very best when we do emerge from this pandemic."

Passenger numbers have fallen dramatically – evidence that people are listening to Government and industry advice to avoid public transport where possible. But even as the number of services begins to gradually increase, it must feel odd to be the Network Rail chief executive asking most people not to travel by train. "It is unusual, because ordinarily, I find myself championing the railway, and working hard to improve performance for the millions of people who typically use the railway every day. But clearly, in these times, we have had to ask passengers to only travel if they really have to." Asked about the long-term impact COVID-19 might have on passenger numbers, Haines responds: "We have to acknowledge that it is highly unlikely passenger numbers will return to 'normal' any time soon." He goes on: "Social distancing has a huge impact – only allowing for around 10-15% of usual capacity – and if after a certain period of time we can accommodate passengers without social distancing, many people will have got used to working from home, and there will be a natural cautiousness about returning to busy rail services."

Haines is calm and modest, yet self-assured and unfazed by what many would consider a daunting role. It's clear that he likes people – perhaps helping to explain why Network Rail's mantra under his leadership is all about 'Putting Passengers First'. He was determined even before he took over the reins in August 2018 that Network Rail should focus less on engineering, maintenance, and major projects – though they remain key parts of what Network Rail does – and focus more on delivering a safe and reliable service passengers can rely on. Haines was

quick to ask staff to consider "why they do what they do". He explains: "If we're not here to deliver for passengers, what are we here for?" It's a message that remains as relevant today as it was when he joined the company.

Haines' knowledge of, and passion for, rail dates back to the 1980s when he undertook a British Rail Management Trainee Programme – widely regarded throughout the industry as comprehensive and grounding. He took the top job at Network Rail knowing that the Williams Review was just around the corner – commissioned by then Secretary of State for Transport, Chris Grayling – following the May 2018 timetable change which caused severe performance issues across the North and the South East. Further spotlight on performance followed when the Rail Regulator (ORR) published a review into performance of routes in the North West – prompting Haines to apologise on behalf of the industry for letting passengers down.

Having long suspected that the current franchising model, combined with chronic network congestion, was unable to meet growing passenger needs, Haines has welcomed the Williams Review with open arms.

One of the reported main findings of the Review is to create a new rail agency to run the industry. Haines is adamant that any new agency must be separate from Government that has the teeth to plan for the long term. He is confident that Keith Williams' advice will help fix these inherent challenges. "The need for reform is as great as it has ever been," he insists, adding that Network Rail "will play its part in repurposing the industry" for the next decade and beyond. "Passenger demand will not return to normal any time soon, so our focus must be on providing a reliable service for those who do need it, and in turn encouraging others back to rail. It's something that will require us to work together, and something that I think the Williams Review will be crucial to."

It would be remiss to not ask Haines about HS2 – a project he views as an opportunity to rebuild not just Britain's railways, but parts of our cities too and add desperately needed capacity to the heavily congested main lines to the north. "HS2 compels our existing network and processes to become match fit, and will allow us to realise the value of the railway to our life," he enthuses. HS2 may become a catalyst for more digital train-to-track technology across the network, yet it still has to convince many, including Haines, that it is a realistic proposition for a mixed traffic railway.

Haines knows that the entire industry must be behind the imminent structural changes if the industry is to properly reform and deliver for passengers. It requires contributions involving everyone in the railways – from Network Rail to operators, SMEs to larger contractors.

It's rare to find people in today's virtual world with such quiet determination. Andrew Haines is one of them. With his sharp focus, it's clear that railways are now facing in the right direction, but in such uncertain times, there will no doubt be challenges along the way.

Prof. Greg Marsden
Institute for Transport Studies,
University of Leeds

Climate emergency: an interview with Professor Greg Marsden

We all have to commit to doing 'our bit' if we are to have any chance of reaching the Government's Net Zero carbon emissions by 2050 and help minimise future global warming. **Professor Greg Marsden** at the renowned University of Leeds' Institute for Transport Studies thinks we are nowhere near ready to hit this target, as too little progress has been made. We asked him what will get us there.

Greg Marsden is one of the UK's leading voices on transport carbon emissions. He is regularly called upon by governments and green lobby groups alike to impart his knowledge on the science behind shifting towards less carbon-intensive forms of transport.

Marsden sees recent 'extreme weather events' as being a catalyst for the current political and social urge to 'do something'. He also sees the rapid shift to home working for those in office jobs, and the uptake of cycling and walking during the current COVID-19 crisis as a potential and crucial learning opportunity to persuade politicians that we can have a very different transport system in the future.

If the British Government is bold enough to do its bit through legislation, then what must local government, business and individuals do? Marsden says there is little guidance on how to reach Net Zero. Yet many MPs are already calling on the Government to bring the 2050 target forwards and establish what we must do and by when.

There is strong and growing commitment throughout the UK, with 278 Local Authorities from Edinburgh to Essex, declaring a 'Climate Emergency'. Many councils have created climate budgets and action plans. Most recently Oxford Council committed £19m to tackle climate emergency though measures such as 400 new electric vehicle charging points and a zero emission bus fleet, as well as incentivising private taxis to go green.

On electric vehicles and technology, Marsden believes that technology alone cannot solve the problem; 'Electric vehicles are great but still use carbon to construct, maintain and dispose. We need to use technology to help us utilise cars better through, for example, car-sharing apps.' Marsden explained how a new model of car-sharing is being trialed in the City of York, where workers committed to ride-sharing to the hospital can have access to a pooled car in the evenings, to reduce individual ownership.

Marsden is adamant that Governments throughout the world would be wise to rethink how many cars are needed in their towns and cities? 'If we are serious about the 2050 target and pathway, we will have to restrict ownership as well as use'. He says, 'It would be an own goal if we didn't simultaneously tackle the equally important issues surrounding car use, road safety and quality of life.' It's here that Marsden sees the ultimate prize - a transformation of our cities to align with Net Zero healthy lifestyle choices.

One can argue that the core business of transport planning companies (including Steer) is providing climate change solutions every day to every client everywhere throughout the world. Marsden says it's our job to convince clients 'the art of the possible'. 'Transport professionals have known for decades what can be done to positively improve people's day-to-day life in our cities, towns and villages, whether that's completely reimagining public space or introducing a workplace parking levy.' Yet it is only now that we have the political will, together with compelling climate science to prove that action must be taken. Businesses with a global reach must bring new workable Net Zero solutions into the fray.

Following his PhD. in Road Traffic and Pollution, Greg Marsden spent a formative year working in Santiago, Chile during 1999-2000, when air quality reached such dangerous levels as to become a public health hazard. Marsden witnessed first-hand how the government quickly introduced a ban on cars using the main routes in the city, as well as an odd and even number plates restriction. The scheme was accepted by residents and the business community because they understood the problem.

It is interesting to reflect on how the acceptance of the need for social distancing during the COVID-19 pandemic has changed the demands for road space reallocation for cycling and walking. This could rapidly change how politicians think about transport. 'Some of the cycling and walking actions have been great, but the news is not all good with public transport use likely to be massively reduced for some time and low oil prices encouraging car use. Being able to adapt our technical advice to the new circumstances to support a climate-smart recovery is going to be critical. Hopefully the short-term COVID-19 crisis will not derail our commitment to the ongoing climate crisis.'

A new Transbay Rail Crossing for San Francisco

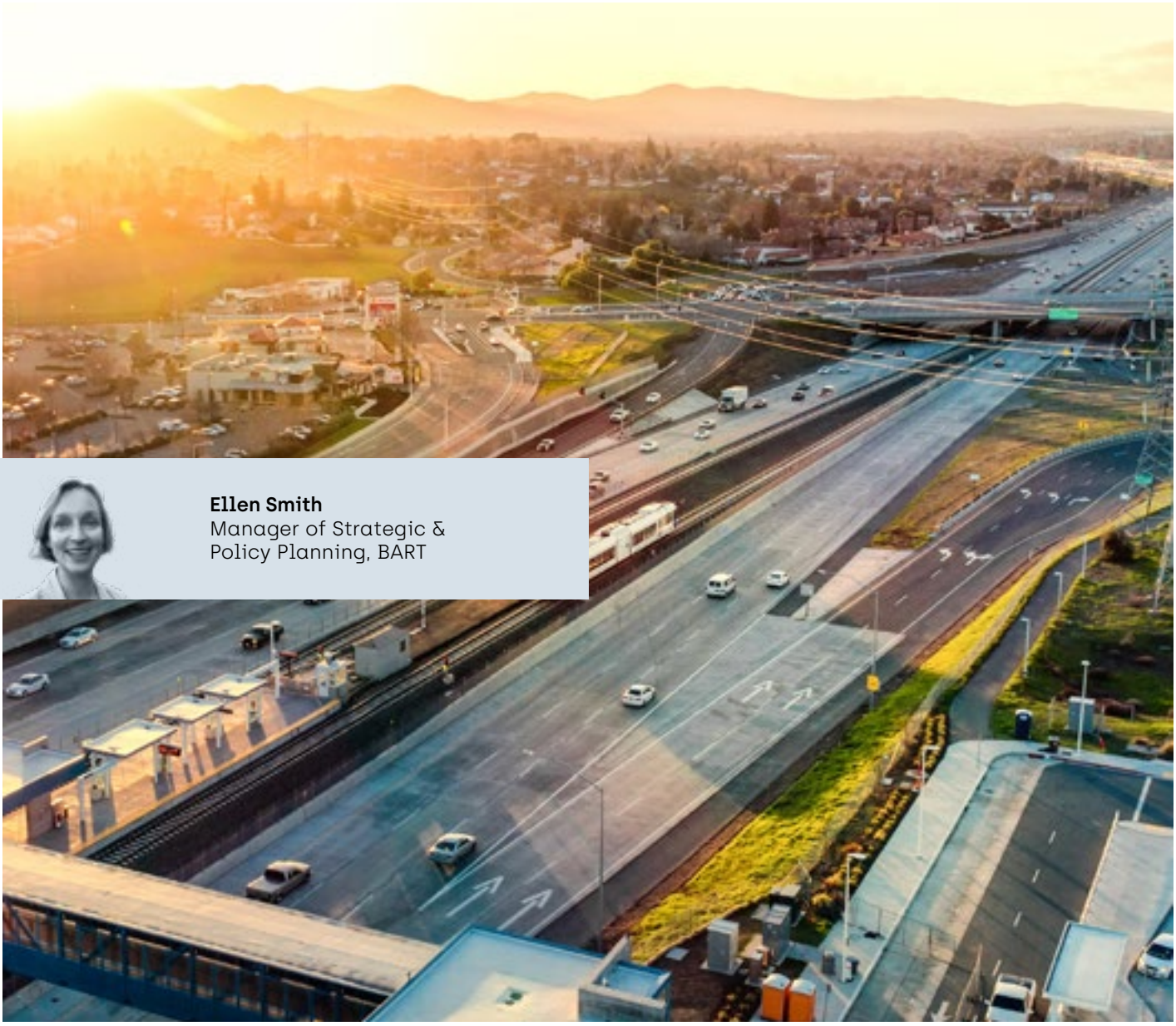
We spoke with Ellen Smith, Manager of Strategic and Policy Planning at Bay Area Rapid Transit (BART). We quickly discovered that her role as lead on the New Transbay Rail Crossing is much more than developing new rail infrastructure. Ellen's appetite for creating development around rail transit stations will help to tackle the Bay Area's 'extreme' traffic congestion.

Ellen Smith has a master's degree in urban and regional planning from the University of Southern California (1983), and after ten years of consulting, including at Leigh Fisher Associates and KPMG, the allure of public sector work brought her expansive skills and passion to BART. Just over 25 years later, Ellen is responsible for developing BART's strategy for this multi-billion-dollar investment.

The Bay Area consists of 7.75 million people living in nine counties, and is the sixteenth largest economy in the world. It's not hard to see why. The Bay Area, widely known for its Silicon Valley economic engine, is home to some of the world's biggest and most profitable companies, including Apple, Facebook and Google. This economic powerhouse is projected to grow significantly over the next 20 years with the Bay Area's population expected to grow by 2.1 million. The northern California megaregion stretches even further, with links to Sacramento and surrounding suburban counties.

What's glaringly apparent for people living in one of the world's most vibrant economies is that traveling to work — or anywhere for that matter — in the Bay Area is a daily lesson in logistics and patience. The motor car is the dominant means of getting from A to B and its use is on the rise. Getting stuck in traffic congestion is a huge source of irritation for most Northern Californians. The proliferation of super-efficient and smart electric — and soon to be fully-autonomous — cars will not preclude traffic congestion and the resultant days we lose in productivity each year. What's to be done?

"Allowing traffic congestion and current levels of transit overcrowding to threaten the Bay Area's prosperity and quality of life is not an option," says Ellen. She believes that one of the essential solutions to curb excessive traffic congestion is to create the right mix of high-density urban land use — residential, leisure, commercial and workplace — around existing and future transit stations. She eagerly described how BART's Transit-Oriented Development Policy has already resulted in less car use around stations.



Ellen Smith
Manager of Strategic &
Policy Planning, BART

So far, 13 high-density mixed-use developments have been built around BART stations, with four already under construction and seven in the pipeline. BART owns approximately 250 acres of land near its stations, and wants to intensify use on these properties.

It's a smart move by BART bosses to have an urban planner with a grounding in politics positioned at the helm of the New Transbay Rail Crossing. Although it sounds like the public transit authority have predetermined their infrastructure goal, it's not that simple. In fact, in June this year, BART's Board of Directors appointed a consortium, led by US-based infrastructure consultants HNTB and supported by Steer, to advise and guide the complex planning for this investment. The solutions must improve connectivity around the Bay Area and the megaregion. BART is partnering with Capitol Corridor, which uses standard-gauge rail, to evaluate how the megaregion can best be served with an enriched rail network. The consulting team will bring best practices and lessons learned from other complex rail projects from around the world to BART and Capitol Corridor.

Over the next few years a thorough examination will be undertaken to understand the diverse stakeholder priorities: what the second crossing should look and feel like; will it serve the complex rail-gauge mix of heavy rail (including Caltrain), BART and California's future high speed rail?; which funding mechanisms will be used?; and, importantly for company executives considering Silicon Valley for their next big investment, when will construction begin and end?

"Urban planning is expansive, that's what I love about it — it brings everything together, the economy, society and the environment", Ellen enthused. Strategic urban planners with the right skills, commitment and vision are few and far between and Ellen has proven she is in the right place at the right time.

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