

momentum  
transport consultancy



COMMOTION

*A year in review.*

# How the pandemic has changed transport



# Welcome to the spring 2021 edition of Momentum's Connect, where we take a retrospective look at our popular and thought-provoking pieces from our Covid-19 Thought Hub.

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Over the past year, the word 'unprecedented' has been used more than we might have ever imagined. The pandemic has brought many changes to everyone's lives, but perhaps – back in March 2020 – we couldn't have predicted the extent to which transport would be impacted, or the prominence it would achieve.

Nobody anticipated the level at which bus, train, tube and car journeys would be replaced by active travel such as walking and cycling. Or that emerging trends such as the introduction of micromobility, for example e-bikes and e-scooters, would be accelerated. Natasha Brown, associate at Momentum said: "Now is possibly the most exciting time to be in transport planning since the 1960s. TfL, the London boroughs and the City of London are reallocating road space across their highway networks. Local authorities can use transport initiatives to unlock a safe and successful Covid-19 recovery phase for residents and businesses, whilst also tackling existing challenges such as climate change and increasing active travel."

In this edition of Connect we're taking a retrospective look back at a number of articles that have been shared through our Covid-19 Thought Hub, along with 'author's notes' on how our views and predictions have changed since their first publication.

We're also looking ahead to the launch of Momentum City 2030. This past year has underlined how progressive transport planning and urban design involves understanding the link between transport and land use, and the future shape of our towns and cities. As we emerge from crisis into recovery, and beyond, it will be critical to the challenges that we face on the future of our economies, our environment and how we tackle climate change.

CIHT Awards 2021

'Team of the Year'  
Winner



06 - 09

written by Ollie Bolderson

## The future of travel. Shock or shift



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written by Kabil Kaliyamoorthi

## Crowd and pedestrian modelling to safely re-open your space



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## Authors' updates





**The Coronavirus pandemic has changed the way that we live, work and socialise. It is a generationally defining moment which will have a wide-ranging catalyst effect throughout society.**

The key question to my mind is whether the changes we're seeing represent a shock or a shift in demand – is this a blip in the way people move, or is this a more tectonic shift in our living, working and travel patterns?

During every major transport, and Information and technology innovation, commentators forewarn the end of the city, or the 'death of distance', or the 'End of Geography' and yet the world's urban population continues to grow; air travel rebounded after 9/11, likewise London Underground and Bus usage after the 7/7 bombings, in each case after relatively short-lived periods of substantially-lower demand.

That being said, at the time of writing Virgin Atlantic has announced 3,000 job cuts and an end to its operations at Gatwick Airport, after British Airways announced they could not rule out the closure of its Gatwick operations, clearly showing the airline industry considers this to be a major shift in their business.

So, the question is will our transport behaviours change forever – or at least for a long while – or just rebound back?.



**What's happened since?**  
Click to read our author's update from Ollie Bolderson



Originally published 11 May 2020

**Mobility trends**

I've had a look through Apple's mobility data, which shows the UK's relative volume of direction requests based on a baseline volume dated 13 January 2020. If Monday 13 January was a normal day (demand is 100), this data shows the difference in daily direction requests over the next three months.

The data doesn't show absolute volumes. I've taken walking, driving and public transport data searches for the UK as a whole (sadly, no cycling data was available). Data available for Leeds, Manchester, Birmingham and London all show near-identical patterns. To simplify, there are perhaps three phases that can be identified from the UK's travel patterns in the last three months.

**Business as usual.  
13 January to 8 March (weeks 1 to 8)**

Travel behaviours are 'as normal' – people are returning to work from Christmas holidays. Apple Maps searches for walking, driving and public transport trips remains broadly constant throughout the three-month period.

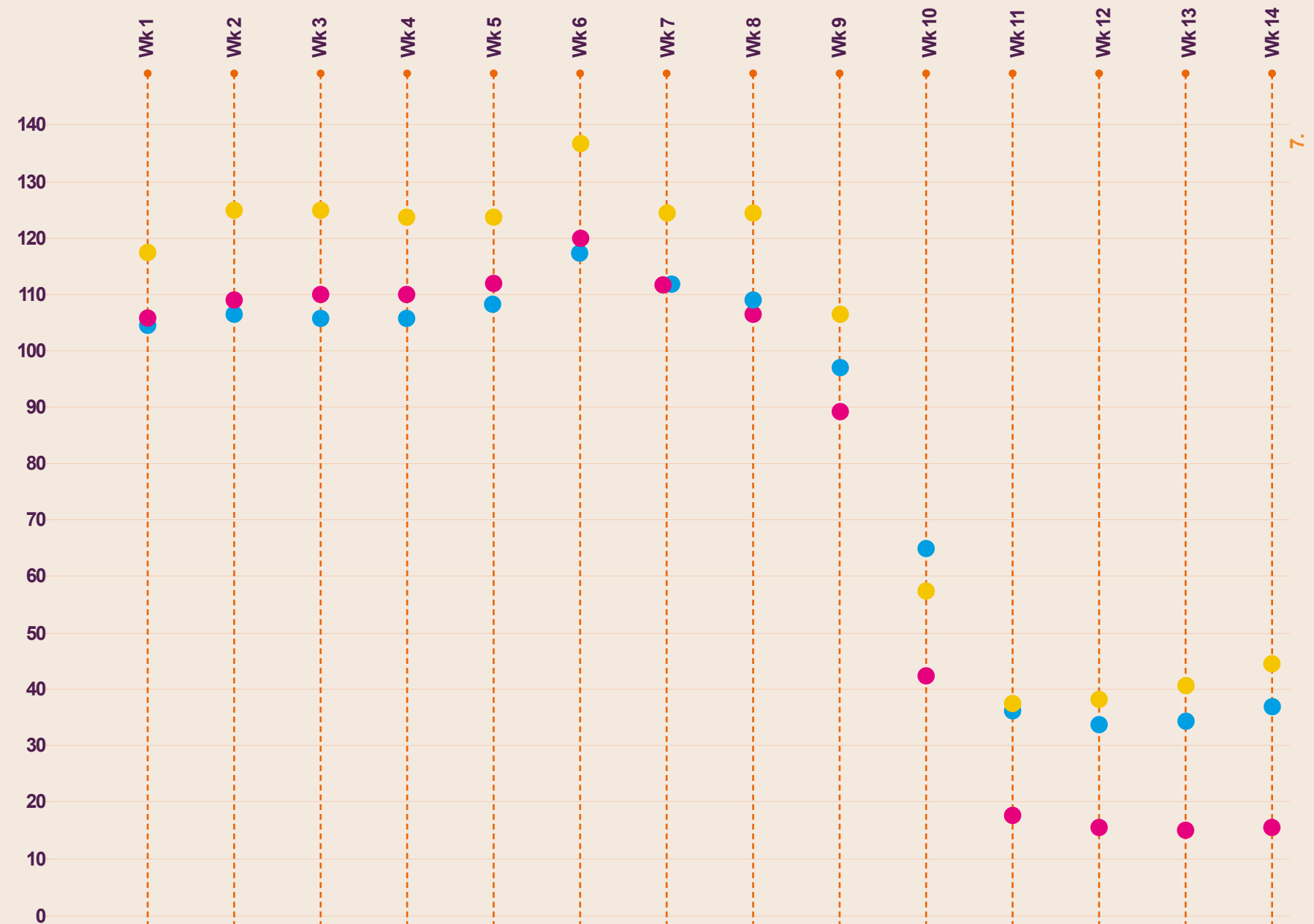
Travel demand and modal choice are driven by trade-offs between the convenience, cost and the accessibility of each mode (amongst myriad factors).

**The rapid drop.  
9 March to 22 March**

A sharp reduction in Apple Maps searches for all modes of transport. Most of the reduction in travel demand occurred before the UK's official lockdown, announced on 23 March.

Personal and public safety becomes the key consideration in travel choices as offices, retail and leisure attractions close.

# The future of travel



Walking Transit Driving





**Lockdown. 23 March to now**  
(originally published 11 May 2020)

Apple Maps searches remain constantly low after the UK Government's lockdown announcement on 23 March 2020. Public transport searches have (relatively) shrunk the most – a post-lockdown demand of 16% compared to 41% and 35% for walking and driving, respectively. This may in part be due to the way we use different modes – people may be walking as part of their daily exercise, or driving to shops – but there is no denying that public transport is a much less appealing proposition during the pandemic.

Public safety is the key consideration in this policy-backed reduction in travel. Only essential journeys are made as the absolute number of trips is significantly lower than normal. Many people are able to work from home and many shopping trips are avoided by online shopping (there has been an increase in online food retail users of 10%).

## Four scenarios for the future

What might the next phase of transport demand look like as we slowly transition out of lockdown? Will we see a reversion to the old way – a bounce-back? Or more of the post lockdown trends, as commuters show caution in their behaviour? Or some form of hybrid?

Looking across the board, then, how might driving, public transport and walking modes bounce back? A return to the baseline for each mode would be returning to 100% (totalling 300% between the three modes). I have modelled four scenarios to better understand what might happen. They are not predictions, but designed to help think about four plausible futures.

# 01.

**Scenario one: the old days:**

Each mode is at 100% – the pre-virus baseline

# 02.

**Scenario two: staying home (high probability):**

As people have invested time, effort and money into making home offices and online shopping work for them, the increase in these practices may be here to stay, resulting in an overall lower frequency of travel. This I think is most likely to affect public transport services, to which people will be most reluctant to return, whereas driving and walking might well remain nearly as attractive as they used to be.

# 03.

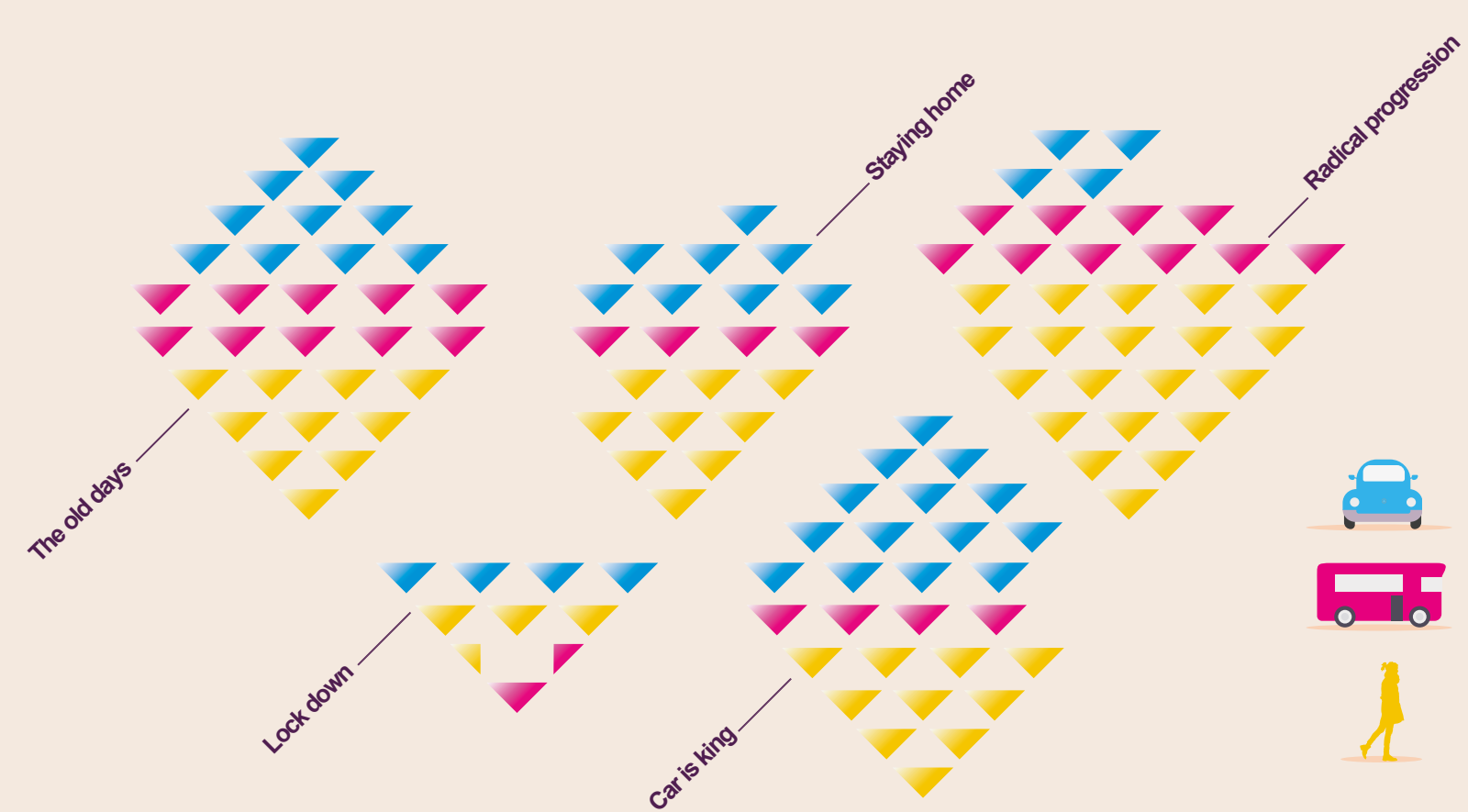
**Scenario three: radical progressive (low probability):**

As people adjust to walking and cycling more whilst roads are quieter and safer, they don't look back and don't return to public transport for everyday commuting needs. Driving demand may be suppressed through road space reallocation to further encourage walking and cycling. A shift from public transport to active travel would free up capacity on public transport services, with lower overall demand and a flatter peak demand (due to flexible working), meaning that public transport would in time, and with the introduction of a vaccine, become a more popular proposition. A rebound to public transport could then cannibalise car travel rather than detract from an increase in active travel.

# 04.

**Scenario four: car is king (medium probability):**

People are unwilling to return to public transport, which is considered a health risk, and private transport is preferred as it's door-to-door and involves very little human interaction. Whilst the data shows that the driving and walking searches are slightly increasing as lockdown continues, public transport usage remains very low compared to its baseline – two of the three busiest, post-lockdown public transport days were in the week lockdown was announced, contrasted with the fact that two of the busiest three driving days were last week.



The way that these scenarios play out will be radically different in different places – my prediction is that areas where public transport was previously the main mode of transport (central cities, especially progressive places) will see a big growth in active travel, whereas those places that are less well-connected by public transport will see people revert back to car driving. Outer parts of cities, then, may have congestion issues, whereas we may need to look at providing more road space for pedestrians and cyclists in inner cities.

This pandemic presents an opportunity to take stock and to evaluate where we were, are and where we want to be, and this is the time to collectively consider how we can seize this opportunity.

### Opportunity 1. Flexibility

More flexible working hours can be beneficial for an at-strain transport system for a number of reasons – increased working from home means fewer trips and peak spreading, where people work with more flexible hours. This could mean a dispersed rush hour and, effectively, a higher capacity for the transport network as a whole. This in turn can support more residential density in suburban areas, something encouraged in national and regional policy, to respond to demand on the housing market. Office design will also be much more geared to flexible work. In many cases, work can be completed anywhere, so offices need to facilitate relationship building, collaboration, and knowledge sharing.

### Opportunity 2. Promoting active transport

Whilst the Apple Maps data hasn't included cyclists, there has been some evidence elsewhere that leisure cycling in the UK has increased during the UK's lockdown.

A proactive rationing of road space, to more closely reflect the substantially lower vehicular demand, might go some way to minimise the effect of a quasi-induced demand as relatively quiet roads and shorter journey times entice people into their cars. This rationing would have a 'double dividend' effect – disincentivising car travel and incentivising travel by walking and cycling by providing more safe and dedicated routes.

### Opportunity 3. Polycentricity and personal travel

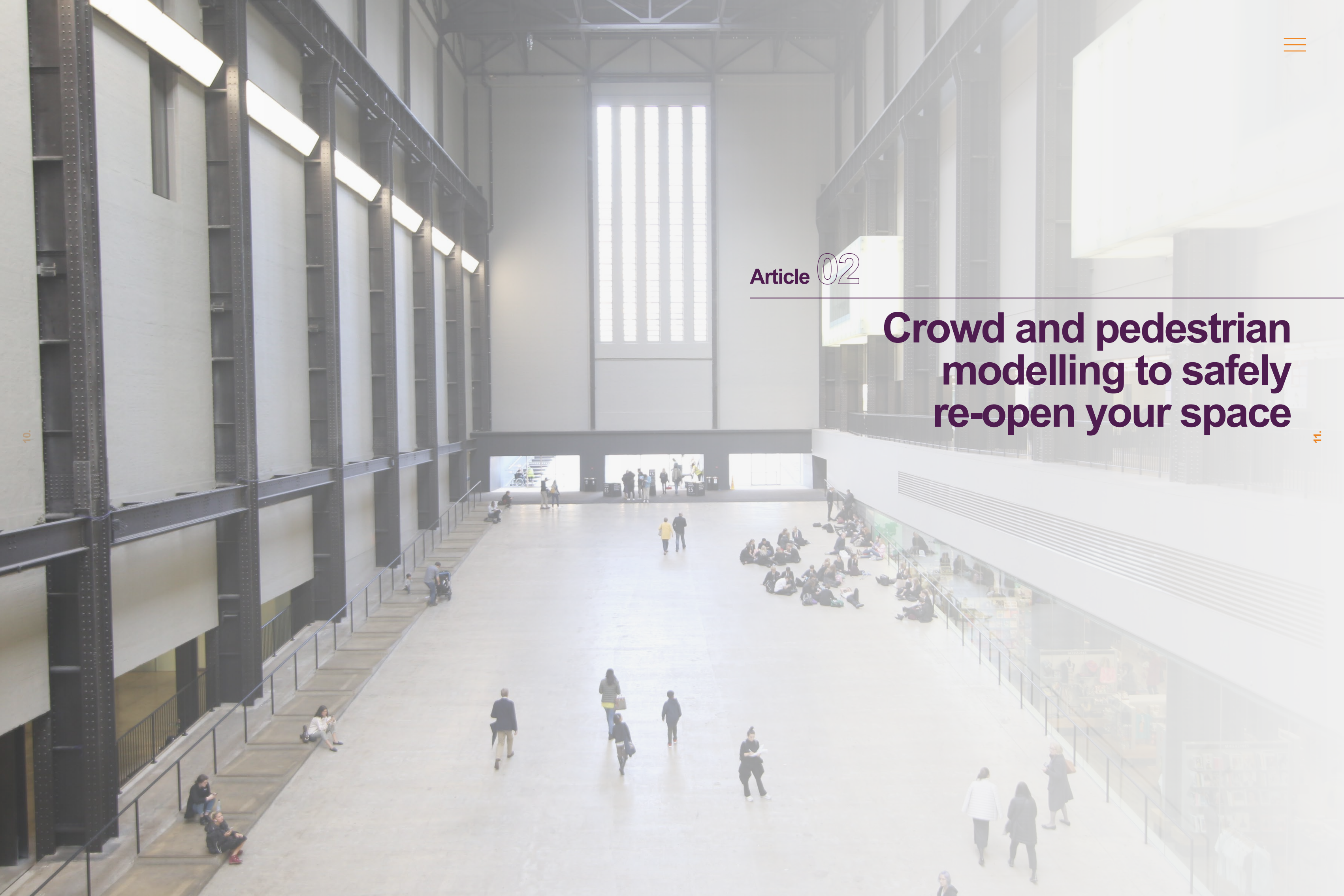
Transport has been a mainframe system – it has been shaped by large, expensive infrastructure predicated on economies of scale. It is now moving into becoming a more personal experience using lighter and more flexible infrastructure to reflect a more consumer-focussed means of using transport services. Where previously transport services were designed to transport workers from the suburbs to their central London offices, now the infrastructure is 'micro' allowing people to make different trips to different hubs. Similar to Anne Hidalgo's 15-minute city concept in Paris, we have an opportunity to rethink our city experience in a way that will be geared towards more multi-modal and active travel to workspaces, retail and leisure facilities closer to where we live, rather than in a single Central Activity Zone.

As we look ahead to life after lockdown only time will tell whether this current crisis will cause 'shock or shift' – but there are many opportunities for change that may just have been accelerated by Covid-19.



Article 02

# Crowd and pedestrian modelling to safely re-open your space



10.

11.



Entrance queue layout with 2m gap between people

12.

# Crowd and pedestrian modelling to safely re-open your space

“Getting back to using our larger spaces is a huge challenge, but it’s one we’re proud to be able to help our clients tackle while staying true to our company aim of creating forward-looking solutions that address the needs of the future city and place people at the centre of our work.”



**What’s happened since?**  
Click to read our author’s update from Kabil Kaliyamoorthi



Originally published 27 May 2020

**Covid-19 has turned our world upside down. People are thinking twice about making single trips or general commuting. Large gatherings, whether for sports, cultural events or even shopping, seem a distant memory.**

As we start to hear more about our phased return to how things were – with some schools and shops able to open from next month – we’re presented with a challenge of the like we’ve never seen before. The Government advice on social distancing and new hygienic measures means we all need more space to do the things we normally do without even considering the physical space required.

Over the decades we’ve grown and developed habits to suit what we have and how we behave in a public space. Changing that habit will take time. Therefore it’s up to us to help our clients to quickly and effectively put measures in place to encourage people to follow certain rules; so we can do the things we want to do in a more controlled, uninterrupted – and most importantly – safe way.


This means reimagining our public spaces, office environments, shopping areas, high streets and schools (to name but a few) to encourage people to follow the rules in an acceptable way.

For many years our crowd flow and pedestrian modelling assessments have been helping our clients to optimise the experience their customers or users have of their venue, development or public space. We’re excited to be able to offer our tools (such as Legion and VISWALK software) and our experience now to help our clients with the new challenges they’re facing as a result of the pandemic.

13.

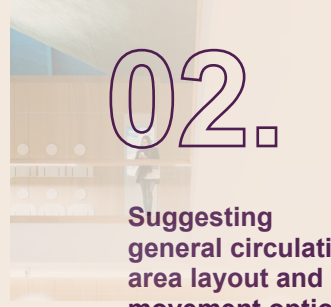
Five ways our tools can help you reopen your spaces safely

**01.**



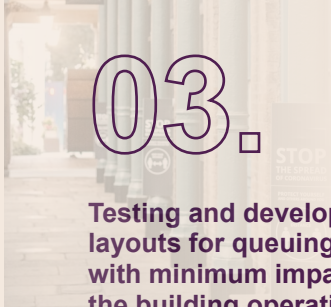
Determining the maximum capacity of people in a space, whether a museum gallery, an event, an office space or a shop

**02.**



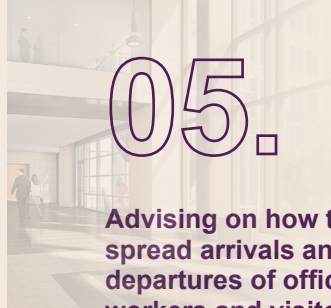
Suggesting general circulation, area layout and movement options

**03.**




Testing and developing layouts for queuing areas, with minimum impact on the building operations or external area; simulating a two-metre separation between each person

**05.**



Advising on how to spread arrivals and departures of office workers and visitors to reduce the risk of conflicts at entrances, lobbies and lift areas

**04.**



Recreating pedestrian movement and testing the capacity of pedestrian areas in line with social-distance-based pedestrian densities and flow rates

**There have been many road space reallocation or “Streetspace” schemes in London boroughs as a result of the Department for Transport’s Emergency Active Travel Fund (EATF) to respond to COVID-19. Some have attracted more attention than others. Some have been deemed successful and others not. Some have been removed due to vociferous local opposition.**

Lewisham Council opted to reduce their low traffic neighbourhoods (LTNs) in Lewisham and Lee Green, due to local opposition. Wandsworth suspended all its trial LTNs and stated that they were not delivering the benefits they wish to see and were also affecting emergency access and traffic flows.

When large-scale road space reallocation schemes are implemented there are often knock-on effects, such as displaced traffic or lower-than-anticipated usage of new cycle lanes or pedestrian space. There will also almost always be opposition where traffic routes become more convoluted or the measures cause congestion. It usually takes about 6 months for traffic patterns to settle down and for people to adjust their journey patterns or change their mode of transport.

The scale of the backlash against some of these measures may be due to the scale of the proposals implemented, or to do with the fact that in the first lockdown people were initially advised to make essential journeys by car rather than public transport, which was then made more difficult by the Streetspace schemes. Most likely it was due to people’s frustration with the overall impact of COVID-19 on their lives.

These schemes were implemented on a trial or experimental basis so they could be monitored, reviewed, and retained, amended or removed. If some of these schemes had been given more time and politicians had held their nerve against the opposition, I wonder if they may have still been in place now, helping to reduce motor traffic speeds and volumes and improving air quality, with the associated climate and health benefits, during lockdown 3?

**Continuing in the face of opposition**

Other London local authorities have continued despite opposition. Lambeth Council has stood firm on its LTNs and believes the protesters are a minority. Croydon and Ealing have faced legal challenges on some of their low traffic neighbourhoods. Islington has amended some schemes to improve local access but is continuing to implement further schemes despite marches, demonstrations and vandalism of signs and planters.

Camden is prefacing its public consultations on LTNs with the statement that 69% of households in the borough do not own a car and – that due to public transport capacity remaining much lower than before the pandemic – safe and easy walking, cycling and scooting routes are more important than ever. This statement highlights up front that those car drivers that complain about any measures implemented are either in the minority of residents or living outside the borough.

Hackney has assessed TfL traffic counts to show that LTNs have not caused a rise in main road traffic, despite opposition and protests from people concerned about the knock-on effect of traffic as well as access issues and the lack of prior consultation.



# Covid road space reallocation

**Consultation is key**

Many of the arguments against LTNs have suggested that new schemes have been set up undemocratically and without consultation. Or that they disadvantage car drivers and disproportionately benefit more privileged communities. It’s also important to remember that in some communities, and for some users (particularly outside city centres), cars and other motorised vehicles are essential for people and businesses to go about their daily lives. It’s these types of situations where we might wish to look at alternative solutions to LTNs, whilst still striving for overall improvements.

The issue of lack of consultation on schemes has now been addressed by the Department for Transport’s amended guidance issued in November 2020 on the importance of engaging and consulting with local communities and stakeholders prior to implementation from January 2021 onwards.

**Meeting a London-wide need**

According to the London Cycling Campaign, by November 2020, London’s Streetspace programme had already resulted in 90km of cycle lanes, nearly 100 LTNs, over 80km of bus lane becoming 24/7 and over 300 new school streets. More schemes will be delivered following the second round of funding announced by the DfT in November 2020.

If the mayor is to achieve his ambitious targets on road safety and emissions, there remains a need for improved walking and cycling facilities in London, as well as a reduction in the number of non-essential motor vehicle journeys. TfL’s latest Travel in London report states that the proportion of journeys made by walking and cycling increased significantly from 29% (between January and March 2020) to an estimated 46% (between April and June 2020); the proportion of journeys by private (motorised) transport rose from 38% to 45% over the same period.

Whether or not these trial and experimental Streetspace schemes have been amended, reduced or removed completely, local authorities should be praised for putting them in on such a large scale. They have risen to the challenge and, despite some schemes being removed or reduced, what they have achieved in a few months is more than would be achieved in several years in normal circumstances.



**What’s happened since?**  
Click to read our author’s update from Natasha Brown







16.

17.

Article 04

# E-Scooters: Love them or hate them



**E-scooters – everyone has an opinion on them. These opinions might have changed based on your experience of them so far, either from your memories of gliding along the Barcelona waterfront promenade or from that time you were nearly knocked off your feet by one crossing Oxford Circus.**

The UK’s stance on these micro-modes has been clear – they’re banned, but, following a call for increased transport options, we can now expect to see some shared-system scooters (perhaps by Lime, Bird, Voi etc) weaving around our streets in the very near future.

Previously promoted as an (arguably) sustainable first and last-mile solution and complimentary to public transport, the need for these vehicles has somewhat changed in the last couple of months. Suddenly, our attention moves from reducing transport-related carbon emissions to providing workers with a mode which allows them to remain socially distanced yet able to make journeys which they would normally use public transport for. In London, it is difficult for us to imagine squeezing ourselves onto a packed tube again, at least not any time soon.

# E-Scooters: Love them or hate them

The UK government has taken a big and bold step forward by moving the original 2021 e-scooter trial period to June 2020 onwards. In the transport industry, countless webinars, roundtables and consultations are taking place to gather viewpoints surrounding this ‘new’ transport mode. Of course, safety remains absolute priority, but the opportunity for people to move independently, particularly in a city such as London is crucial.



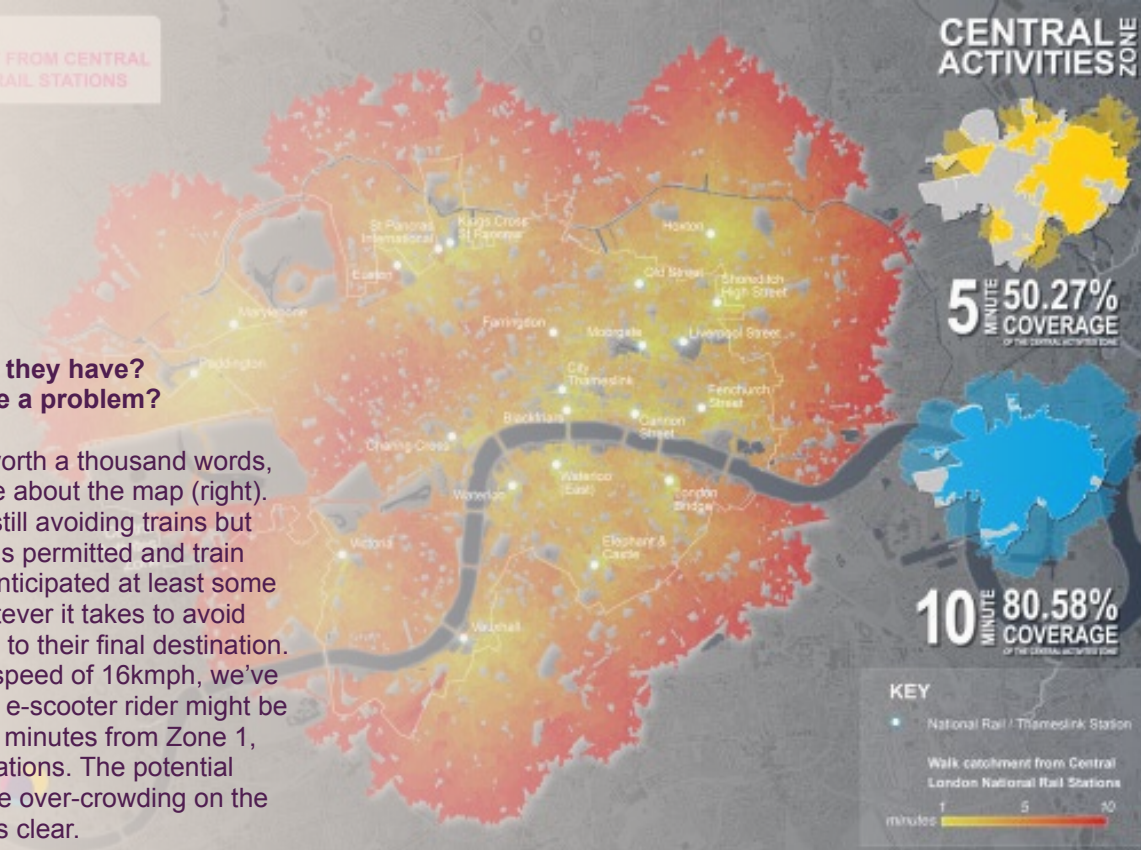
**What’s happened since?**  
Click to read our authors’ update from James Draper and Grace Packard



Originally published 24 June 2020

**So, what potential do they have? Do they actually solve a problem?**

They say a picture is worth a thousand words, well, we think the same about the map (right). At the moment, we’re still avoiding trains but once more movement is permitted and train travel is required, it’s anticipated at least some Londoners will do whatever it takes to avoid using the tube to travel to their final destination. Based on an average speed of 16kmph, we’ve plotted the distance an e-scooter rider might be able to travel in just 10 minutes from Zone 1, central London train stations. The potential for e-scooters to reduce over-crowding on the London Underground is clear.



**But what about active travel?**

Of course, many of these journeys can be walked (a third of the speed) or cycled, though the convenience of an e-scooter is potentially attractive to the masses.

Moving people from tube to scooter could also encourage future active travel as confidence in moving about the streets increases. Potentially, e-scooters provide that stepping-stone from polluting car use and over-capacity public transport towards the sunnier realms of active travel.

**Facilitating their usage**

To facilitate the use of e-scooters and other micromobility methods, there is an utmost need to make streets safer spaces than they are at present.

Recently, the Department for Transport announced an ‘Emergency Active Travel Fund’, made available to all local authorities in England. This fund has been developed based on the proportion of adults in each local authority who travel to work via public transport – with the emphasis that some of these trips could otherwise go to private cars. Micromobility and associated measures provide a good alternative to private car use under these circumstances. Our next hope is that local authorities apply for the funding and utilise it effectively

Indeed, several London boroughs and other local authorities have been successful in their applications for funding and have already been consulting on local schemes.

Some are promoting schemes known as ‘low traffic neighbourhoods’ where, via the usage of temporary modal filters, vehicle access will be reduced to residential areas in an effort to promote travel by other means. For example, the London Borough of Southwark is looking to implement low traffic neighbourhoods across Walworth and Kennington. These schemes are both aiming to provide cycling lanes and widened footpaths, facilitating e-scooter travel. To see what each local authority is doing, search for the name of your council along with ‘Streetspace Schemes’.

Of course, e-scooter trials only permit the use of shared e-scooters however one must give thought to privately-owned scooters. Similar to bicycles, where will they be parked, charged and stored? Perhaps it’s time for developments, offices in particular, to look past the bicycle and provide space for e-scooter users. But should they stop there? Are we at a cusp of a micromobility revolution in the UK? Will other micro-modes start entering the market?

**Looking forward**

It is absolutely imperative that each rider AND driver takes responsibility for the way they use the roads to keep them safe for everyone. Above all, pedestrians must sit at the top of the hierarchy – streetspace is their space and e-scooters must not disrupt that. As we pull away from the depths of the pandemic and the primary use of e-scooters moves back towards being a first and last-mile solution, urban designers, policy-makers, technologists and road users will need to adapt to ensure that we continue to make the most of the mode, both for society and for sustainability. We should look to the future, envisage what we want and set out to get it.

# Transit-oriented development

20.

**Transit-oriented development (TOD), be it around a rail, underground, light rail, tram, or bus rapid transit line, has been a cornerstone of urban revival for the last decades. It's a remarkably simple idea: if people and urban activities are concentrated around key transit hubs, then users would choose not to travel by car.**

Even before cars, it is around the early concepts of TOD that modern mass-transport systems were developed, with lines stretching out on green fields, shops developed around the new stations and houses within walking distance of both. While the idea faded during the car boom of the second half of the 20th century, preferring sprawling suburbs and retail

parks, the concept was then recovered in search of a more (socially, environmentally, and economically) sustainable urban form.

The concept then broadened, to include Vancouver's Transit Oriented Communities where the focus shifts from the development (referring to a single plot or project) to the integration of economic vibrancy and density within existing neighbourhoods. The scope was further extended to include active travel, walkable neighbourhoods around key stations and the provision of high-quality infrastructure for urban cycling, thus extending the catchment of the TOD and public transport to a much wider area reachable by bike, both in London (Healthy Streets) and, again, in Vancouver.

**The post-COVID recovery poses significant risks to this model.**

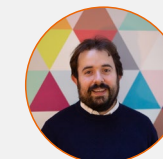
TfL estimates that public transport capacity will have to be reduced by 80-90% for as long as social distancing measures are in place in some form, making it impossible to rely on mass transit to service high-density developments.

The psychological impact of an extremely serious, and not yet clearly treatable, disease – transmissible through droplets between people in close proximity – casts significant doubts on the appetite to return to dense, crowded urban areas. Although not all large metropolises have higher infection rates than other areas (for example, New York has, but London does not), car-based low-density suburbs might represent a reassuring response to avoiding infection.

Although probably inevitable in the short term, dense, walkable and transit-oriented neighbourhoods should not allow a car-based recovery to stop the sustainable urban and mobility regeneration momentum. It is encouraging that a consensus on these kind of measures seems to be present among most European cities – from Milan to Paris, and Berlin to London. The Streetspace for London plan (as well as the similar transport interventions being developed by the City of London and, in my home country Italy, by the city of Milan) is an extremely positive example of such an approach.

I find particularly interesting the 15-minute city approach of Paris, “based on four major principles: proximity, diversity, density and ubiquity, [...] individual areas within the city should be able to fulfil six social functions: living, working, supplying, caring, learning and enjoying”<sup>[1]</sup>. Each city neighbourhood should be within a 15-minute walk, bike ride or public transport trip from key amenities, retail and workplaces. A particularly interesting element of the plan is the approach to re-use existing infrastructure outside its planned hours or use.

As Carlos Moreno, professor at University of Paris 1 Pantheon-Sorbonne, plan creator and advisor to mayor Hidalgo, says: “Hidalgo’s plan would add offices in neighbourhoods that lack them, so people can work closer to home. Some people could work in neighbourhood coworking hubs; for many jobs now, the biggest hurdle will simply be convincing companies that employees can successfully work remotely (although the tragic circumstances of COVID-19 seem to have given a significant push in this direction). Another key to the approach is finding multiple uses for infrastructure that already exists. Libraries, stadiums, and other buildings could be used outside their standard hours. Nightclubs could double as gyms in the afternoon”. During its development, London expanded to incorporate the surrounding towns to become the “city of villages”: the London Plan identifies more than 200 town centres, from international attractors down to local and neighbourhood centres, most of them already clustered along public transport stations or interchanges.



**What's happened since?**  
Click to read our author's update from Claudio Borsari



*Originally published 26 June 2020*

As lives have become more local during the lockdown, these centres and clusters could very well be the future of transit-oriented developments: located within 15 minutes' sustainable travel from their users, focused not solely on high- (or hyper-) density, heavy mass transit infrastructure and utilitarian linked-trips (home to school to post office to work to groceries to home), but also on a more holistic approach to urban lifestyles that takes into account work-life balance, social and family interactions and the dissemination of economic opportunities across metropolises, towns and cities, rather than in small, often (economically and socially) inaccessible clusters.

And while we look at making these clusters accessible (across multiple dimensions – from transport, to businesses, to inclusivity), we should be aware of the risk of segregation between these 15-minute neighbourhoods, if the sole focus is how to connect the centres to the surrounding areas. As discussed by multiple studies and analyses over time, the boundaries of what we define as neighbourhoods become the location of so-called barriers (such as infrastructure lines for example, or even actual walls), often creating social segregation along the lines of ethnicity, or income, or religion. The design of these boundaries, according, for example, to Richard Sennett, should embrace a level of informality that allows both adjacent differences and newcomers to generate unplanned and unexpected elements of urban creativity (in contrast with the more determined and homogeneous centres).

Should the forced break in daily lives encourage thinking on how to avoid the mistakes of the past, once the more immediate threat and fear of the contagion subside (be it because of vaccines, treatments or just because we get used to it), we might find a clue to the future of transit-oriented developments in this tension between planned centres and informal edges, as they move from transit oriented to sustainability and inclusivity oriented, and from development to communities.

<https://www.theguardian.com/world/2020/feb/07/paris-mayor-unveils-15-minute-city-plan-in-re-election-campaign>

21.



YTL ARENA BRISTOL

LET'S MAKE  
MEMORIES THAT LAST A LIFETIME

LIVE TONIGHT  
STEREOPHONICS

23.

Article 06

# The future of crowd movement in stadiums

**There seems to be some cautious optimism that 2021 will (hopefully!) be the year that full crowds will make a return to stadiums and music venues. However, even before the Coronavirus lockdown, attendance at live sport and music events was in decline due to the high-tech and HD viewing experiences that are increasingly available and affordable to many fans.**

Stadium operators will face several challenging issues when fans can return. These will range from ensuring and managing a safe evacuation, general crowd management and operations, and busy concourses with queues and congestion. All these factors can make life very difficult for stadium staff, as well as impact on spectators' matchday experience, resulting in potentially reduced spending and profits.

So how do we make sure that spectators want – and feel comfortable and safe – to come back when restrictions are lifted or loosened? And what can stadium operators and owners do to enhance their visitors' experiences, and to plan and design for seamless spectator movements, transactions and journeys to keep fans coming back week after week, helping to maximise stadium profits after so many months of closure?

#### **Increasing fan engagement using technology**

Technology – such as using wi-fi connectivity, Bluetooth, sensors and cameras – is a powerful tool that, by gathering important information, can increase fan engagement and optimise spectator movements around a venue; all of which contributes to happier fans willing to spend more money on event days.

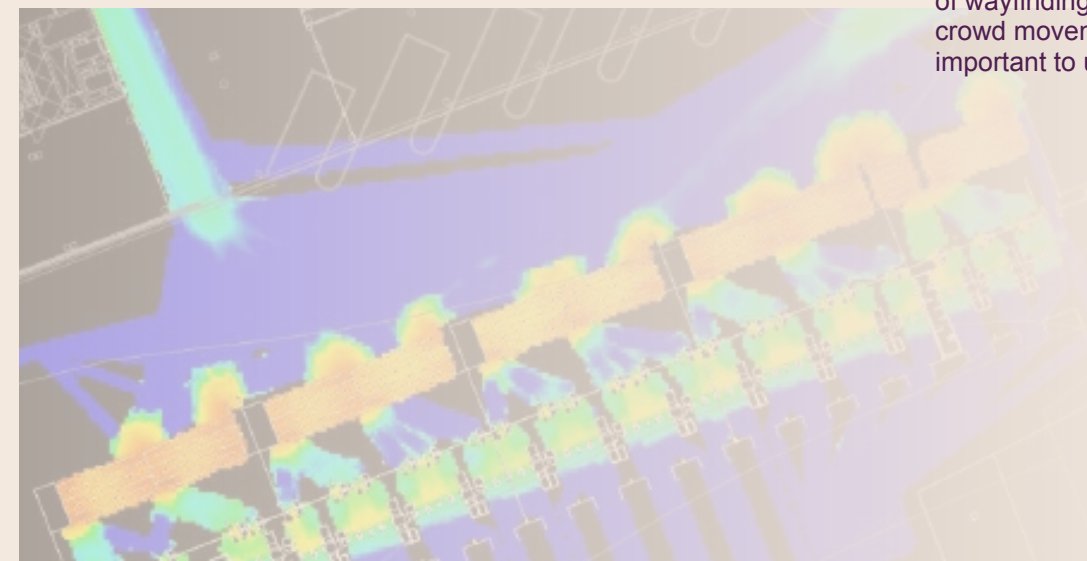
Understanding the power of real-time data is key. Tracking spectator movements around a stadium can provide crucial insight and a deeper understanding of how people move through spaces and help operators identify problem areas and uncover potential solutions.

Real-time data can also be used by event staff to identify any particularly busy areas and re-route spectators to alternative locations if required. This immediate transfer of live data is a crucial tool in managing event crowds and keeping spectators safe.

By identifying trends in crowd movements from this data collection, stadium operators are also much better equipped to develop operational crowd management plans that will ensure the efficient movement of spectators through their space. This will help in achieving seamless event day movements and fan safety in the event of an evacuation or emergency.

#### **Wayfinding and navigation**

As well as gathering useful information, mobile apps can be used by spectators for wayfinding (either within the stadium, or to/from transport nodes) or for pre-ordering food and drinks for half-time or interval periods (for example). Mobile apps can also use real-time data to inform spectators about current queue lengths or crowding, redirect them to quieter areas of the stadium, or advise them to wait in their seats for a period. These solutions can have hugely positive impacts on spectator movements and circulation space within the stadium, by reducing queues at concessions and helping to evenly distribute demand to underutilised areas.



# The future of crowd movement in stadiums

#### **Crowd flow modelling**

Crowd simulation software is an effective means of analysing and visualising the impact of operational crowd management measures or general spectator movement around a venue.

We use simulation modelling to test more complicated environments for our clients, such as a stadium concourse during half time. In this instance, the capacity is not just a function of the dimensions of the space (even though this is often how a concourse is designed). For example, in stadium concourses, you can find people entering and exiting, circulating, dwelling, and queueing. Complicated and conflicting movements need to be assessed to ascertain realistic capacities. How the use of wayfinding and navigation apps will affect crowd movements in these spaces is also important to understand.

#### **Looking ahead**

Many of us at Momentum are sports fans and are keen to be back in stadiums, grounds and arenas to support our teams. But in these uncertain times it's crucial that venues are able to open up effectively and above all – safely – taking into account ongoing restrictions and guidelines that could be in place for some time to come. We look forward to working with our clients in the coming months to help them overcome this challenge.



**What's happened since?**  
Click to read our author's update from William Heubner



*Originally published 16 Feb 2020*

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**Now more than ever it is incumbent on us as transport professionals to support development which puts people first. This includes health, safety and wellbeing in this time of international recovery, and beyond, and to respond to those existing, longer-term challenges of climate change, public health and poorly-connected communities – to name but a few of the challenges that we’re all working on to improve.**

”

Roy McGowan | Managing Director, Momentum

*Writing in response to the Centre for London report “Building for a New Urban Mobility”*



# 02.



## Crowd and pedestrian modelling to safely re-open your space

Over the last year, we've all learnt to adopt the various restrictions in place to tackle the pandemic; our behaviour in public spaces and when using public transport facilities has been greatly influenced by them. The vaccine rollout and the relaxation of restrictions have helped with public confidence to go out and participate in events. This again redefines how we plan for events and prepare our facilities (public areas, workplaces, retail areas, event facilities etc) for day-to-day use.

Flexibility in assessing conditions and adopting changes based on prevailing behavioural trends and government advice has been key. Our advice will continue to consider these trends while also futureproofing our clients' facilities.

28.



# 03.

## Road space reallocation

There has been less noise made in the media since the article was published – perhaps as restrictions are easing people have a different focus. Or perhaps the change to the government guidelines on consulting on proposals prior to implementation from January 2021 is allowing people to air their concerns and enabling local authorities to take them on board at the design stage.



# 01.

## The future of travel - shock or shift?

A year on and – transport-wise – we've seen a bit of everything. One area of concern remains the use and funding of public transport. The Government's large changes to rail and buses in England speak to this. Meanwhile, car driving has recently surged to pre-pandemic levels. We are, however, seeing improved pedestrian and cyclist infrastructure. The way that gaps in public transport demand are plugged – by private vehicles or active travel – will define the next year for transport in London, and beyond.

# 04.



## E-scooters are coming

The first e-scooter trial started in Middlesbrough in July 2020 and even before we saw scooters on the streets of London (with the trial beginning on 7 June 2021) the UK had more than 12,000 (approx.) shared e-scooters available for either short or long-term hire. A cautious approach has been taken with London only launching in 5 areas to begin with and some trials have been stopped and then restarted due to safety concerns, but we've seen a generally positive beginning to the trials with it even being described as a 'policing non-event'. With an average journey length of 3-4km, early signs indicate great potential to replace short private car journeys.

As we step out of the pandemic we look forward to understanding the role e-scooters might have in towns and cities in the future. An intriguing combination of operating companies continue to battle it out to get their scooters involved in trials. It will be particularly interesting to see how competition promotes innovation in types of scooter, and how they will respond to user and government feedback.

# Authors' updates

# 05.



## What's next for transit-oriented development?

A focus remains on the 15-minute and 20-minute city concepts (if considered as a one-way trip or two-way trip respectively). Most cities are not backing down from the shift to walking and cycling, and designing for sustainability and inclusivity (not only for disabled users, but for all user groups) remain a priority. Together these locations will create cities of spaces connected by cycling or public transport, giving everyone the choice and opportunity to easily access local and metropolitan facilities whilst maintaining the strength of cities as places for socialisation, meetings and exchange.

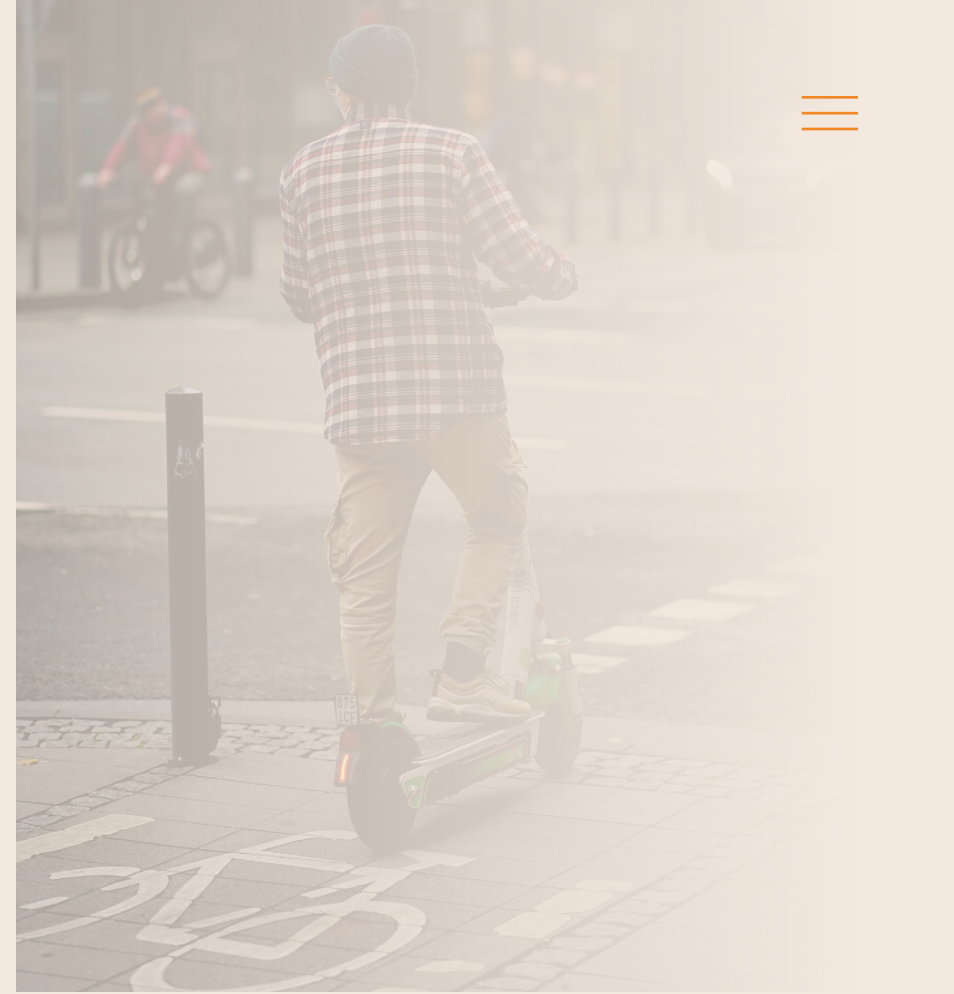
# 06.



## Planning for a return to stadiums

Since this article was first published it's been wonderful to see fans starting to return to stadia for pilot, and limited capacity, events. The Premier League's decision to allow up to 10,000 home fans to watch the final game of the 2020/21 season, and the good progress we're seeing generally, also gives us hope that we might even see Wembley host over 80,000 at the Euros! But the way in which stadium operators safely get back to full capacities remains an important question for many, and after such a long period of fans experiencing events from the comfort of their own home, planning for an amazing visitor experience to get fans back will be crucial.

29.



# Momentum City 2030 is coming...

**Over the coming months we'll be setting out on a journey through Momentum City 2030 - an exemplar city highlighting the best of good urban design and transport planning.**

Crucially, at this challenging time, we'll look at the range of solutions which will build back equitable cities, address the challenges of public health and climate change and deliver connected spaces which safeguard the city and our environment for future generations - unlocking the key role that cities and buildings play in achieving net zero.





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and our blog.

