# THINKING CITIES

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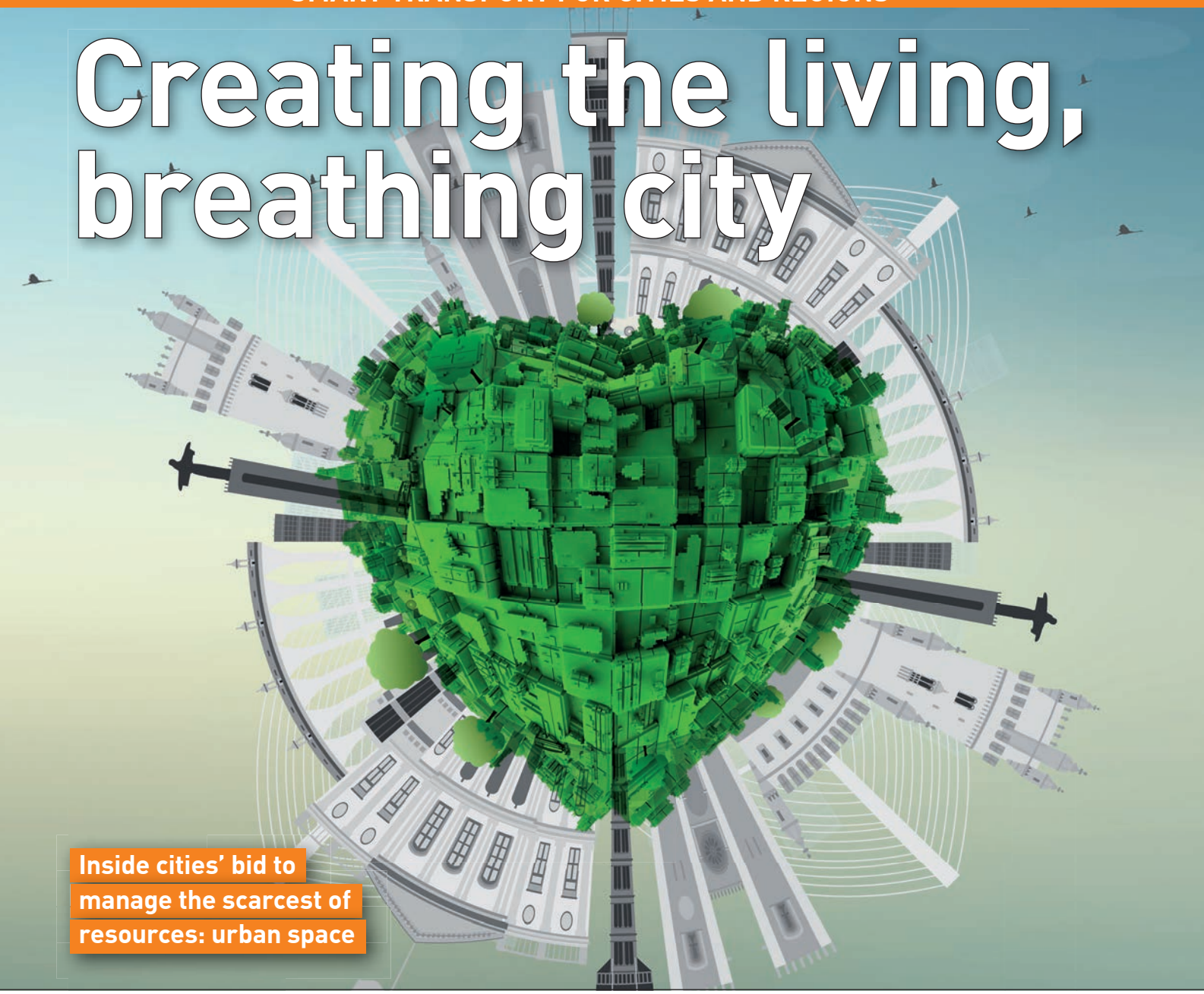
SMART TRANSPORT FOR CITIES AND REGIONS

# Creating the living, breathing city



Inside cities' bid to manage the scarcest of resources: urban space

● AARHUS ● AMSTERDAM ● ARLINGTON ● ARNHEM ● BOGOTÁ ● CHICAGO ● THE HAGUE ● ÎLE DE FRANCE ● LEWISHAM ● LILLE ● LISBON ● OSLO ● OXFORD ● PARIS ● ROTTERDAM ● ROUEN ● STOCKHOLM ● TRONDHEIM ● UTRECHT

# GET OUT OF MY SPACE!

**Karen Vancluysen** and **Kevin Borras** introduce the novel concept of cities putting their inhabitants' needs above those of the vehicles that clog and pollute their streets... but it's not really novel at all

Urban space is scarce and therefore very valuable. Precisely because of that reason, managing urban space can be a very powerful tool for local and regional authorities when it comes to deciding which functions they want to allocate to which urban areas and which transport modes they choose to prioritise. For decades, the private car has claimed and has been granted, a major share of urban space, not only when driving around in cities but also, and even more so, while standing still. Today, the trend is to limit and reduce the space that cars occupy in city centres and to move from streets for cars to streets for people.

Many cities have embraced and prioritised other and more sustainable transport modes for many years already, reflected in the way they have designed their streets and allocated space, for example to accommodate the bicycle in a safe, pleasant and convenient way, making it the fastest means to move around in a city. Dedicated bus lanes are another example of prioritising space for sustainable transport modes in cities. Offering seamless, multimodal and intermodal mobility to the citizen also requires giving space to high-quality interchanges and multimodal hubs that allow users to easily combine and switch modes.

At the same time, a wide variety of new mobility services is entering the market, mostly at the initiative of private commercial players. They also claim their share of urban space. Sometimes they even represent new hybrid-type modes, such as electric kick scooters, which require new regulations and safety measures or even infrastructure, while ride-hailing services bring along pick-up and drop-off movements.

And what about this other much-talked about innovation that is coming our way, automated transport? Will it make the use of urban space more efficient, will it release parking spaces for other purposes, or will it lead to even more kilometres driven and urban sprawl? And how much public space should we dedicate to electromobility infrastructure with the benefit being cleaner air? Or what about this new dimension that seems to be entering the game as well, namely air space and drones?

Against the backdrop of all these changes and emerging innovations, cities and regions more than ever should be in the driver's seat as managers of space. It is clear that space will need to be managed more dynamically and that its use may vary according to the time of day and changing needs or priorities. Also pricing the access to and the use of space is instrumental in the fight against both air pollution and congestion.

> ***Today, the trend is to move from streets for cars to streets for people.***

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The theme of this, the 13th issue of *Thinking Cities*, is Creating The Living, Breathing City. Or, to put it another way, this issue is concerned with the idea of the liveable city. Surely that should be a basic tenet of any city – that it's a safe, pleasant and even interesting or exciting place to live? Otherwise, why live there? Why not move to another city where your needs are (largely) met?

The cities that have contributed articles are not claiming to be perfect and to have solved every liveability problem that has come their way. Indeed, in some cases this is why they have contributed – they are sharing the measures they've taken and offering them as an idea. What worked in Trondheim (in fairness, what worked exceptionally well in Trondheim) might not have worked at all in the London Borough of Lewisham and vice versa.

As the Polis Annual Conference returns to Brussels, a city where space is at a premium (and yes, we realise that this is an understatement), making the best use of space for the benefit of citizens rather than automobiles was a rather fitting topic to focus on. Is this particular race for space one that we can win? Read the 21 articles that follow our introduction and make your own mind up but it's a fairly safe bet that we're moving into a new era of city consciousness.

> ***Surely that should be a basic tenet of any city – that it's a safe, pleasant and even interesting or exciting place to live?***

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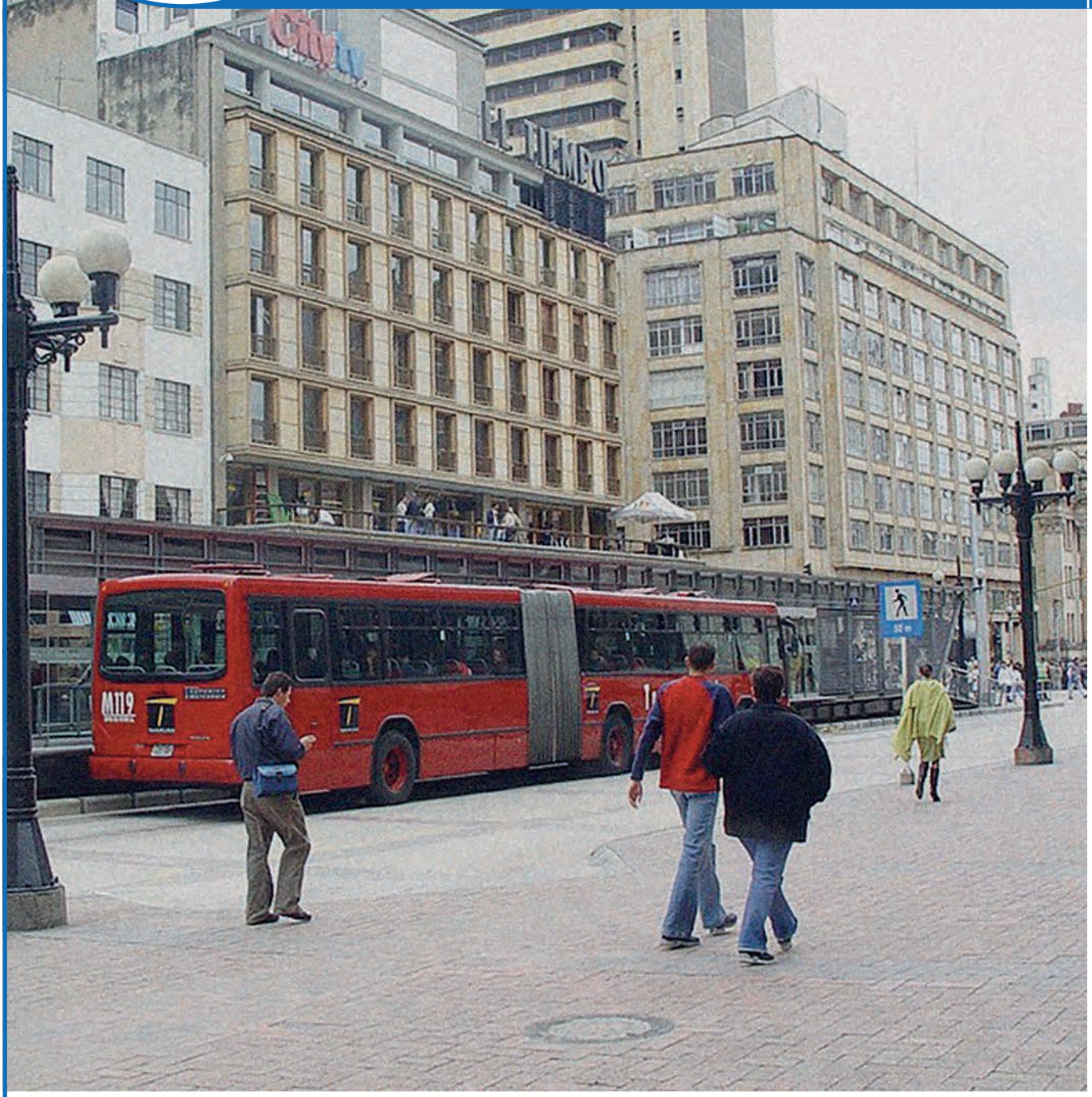
# Cityview

Senior transport officials from forward-thinking cities around the world discuss their plans for the future and how they are addressing the mobility issues that matter most to their citizens.

- Bogotá – Setting an example for integrating new mobility services
- Trondheim – Positive shortcuts in the city of tolling
- Rouen – Automated shared cars coming to a town near you...





Bogotá city centre

# Mobility for the masses

## The Bogotá Method: a "TransMilenial" Challenge with an innovative solution

With its ongoing urban mobility transformation process, an already world-wide famous bus system and innovative private/public partnerships, **Daniel Herrera** reports from Bogotá, Colombia, a city that is setting an example of new mobility services integration and resilience that could inspire real change in similar contexts

Old TransMilenio line at Av Jimenez

***The city's public transport was managed by private traditional transportation companies who provided a poor-quality service due to a crumbling fleet of old buses and a deteriorated road network***

For decades, the Colombian capital has been characterized by having a complex urban mobility situation. Inefficiency on times, scarce infrastructure and the lack of a proper public mass transportation system have caused a burdensome situation for most of the city dwellers of this Latin American metropolis. Before the construction of the world-famous Bus Rapid Transit system (BRT) TransMilenio, the city's public transport was managed by private traditional transportation companies who provided a poor quality service due to a crumbling fleet of old buses and a deteriorated road network, all combined with an evident lack of civic-mindedness from all different actors within the public realm, such as bus drivers, passengers, pedestrians, and even road traffic control officers.

## FROM A TRADITIONAL PUBLIC TRANSPORT SCHEME TO A MODERN MASS PUBLIC TRANSPORT SYSTEM

That gloomy urban mobility past started to change at the beginning of the 21st century, once the city decided to set out an ambitious project to completely transform its public transportation system, a project that not only entailed a physical change in the built infrastructure but also required citizens to embrace a sense of belonging for the public realm. As a result of this process, the city's public authorities developed TransMilenio as the perfect cost for value solution to provide the city with a modern mass public transport system without breaking the city's budget. Even though a metro system would've been the best solution given the size of the population and the distances to cover, at that moment the smartest solution was to promote a system that could be built quckly and with the minimal conditions to provide a dignified mass public transport to citizens tired of the traditional system.

## THE BRT'S SUCCESS AND THE NEXT STEP TOWARDS A METRO SYSTEM

With the construction of the BRT, the city was prompted to develop a dense network of cycle paths and associated infrastructure that also had the added bonus of achieving the aforementioned change in the citizens' civic-mindedness.

As of today, even though the system has recently expanded its infrastructure

and bus fleet, it faces many challenges since a BRT system for a city the size of Bogotá is intended to be a transition scheme towards a heavy metro system. The debate sustained among political actors over the construction of the metro system has been subject to intense discussions over decades, but the city is finally seeing an end of a public tender process that will lead to the construction of the first metro line by 2020. Even though the BRT system counts 114km of main lines, it still falls short of mobilizing a city of 8m inhabitants. However, its construction brought, as mentioned before, infrastructure offsets represented in a 400km cycling path networks (one of the largest in the world), major improvements to the road network and a sense of modernity to a city that needed concrete actions to overcome an unbearable urban mobility situation by the end of the century.

Transmilenio line NQS

***The city is finally seeing an end of a public tender process that will lead to the construction of the first metro line by 2020***

## AN ONGOING MOBILITY TRANSFORMATION PROCESS OF INNOVATIVE SOLUTIONS

Given the fact that the city's current transport offer still faces many challenges to provide citizens with accessibility options, new mobility services arise as service modes favourable to complement traditional transport providing first-last mile connectivity, but also as a sustainable solution for short-distance trips of any purpose. The worldwide eruption of new mobility services has not been unfamiliar to Bogotá since the city saw, as have many other places around the world, its streets flooded almost overnight with e-scooters and other shared micro-mobility devices. Many companies such as Lime, Grin and Movo launched their operations and with it, many concerns related to public space management, road safety, equity, and operational requirements arose among citizens and public authorities. As a result, the city decided to take a regulatory approach based on permits through the resolutions 209 and 336 of 2019, which establish the minimal requisites companies must fulfil to operate. The resolutions also define caps per operator, delimits a zone in which companies can provide the service and determines the data collection platform the companies must implement to share data with the mobility department. Finally, private shared micro-mobility operators must comply with the national road code and the circulation and parking rules defined by the resolution 006 of 2018.

### Bogotá

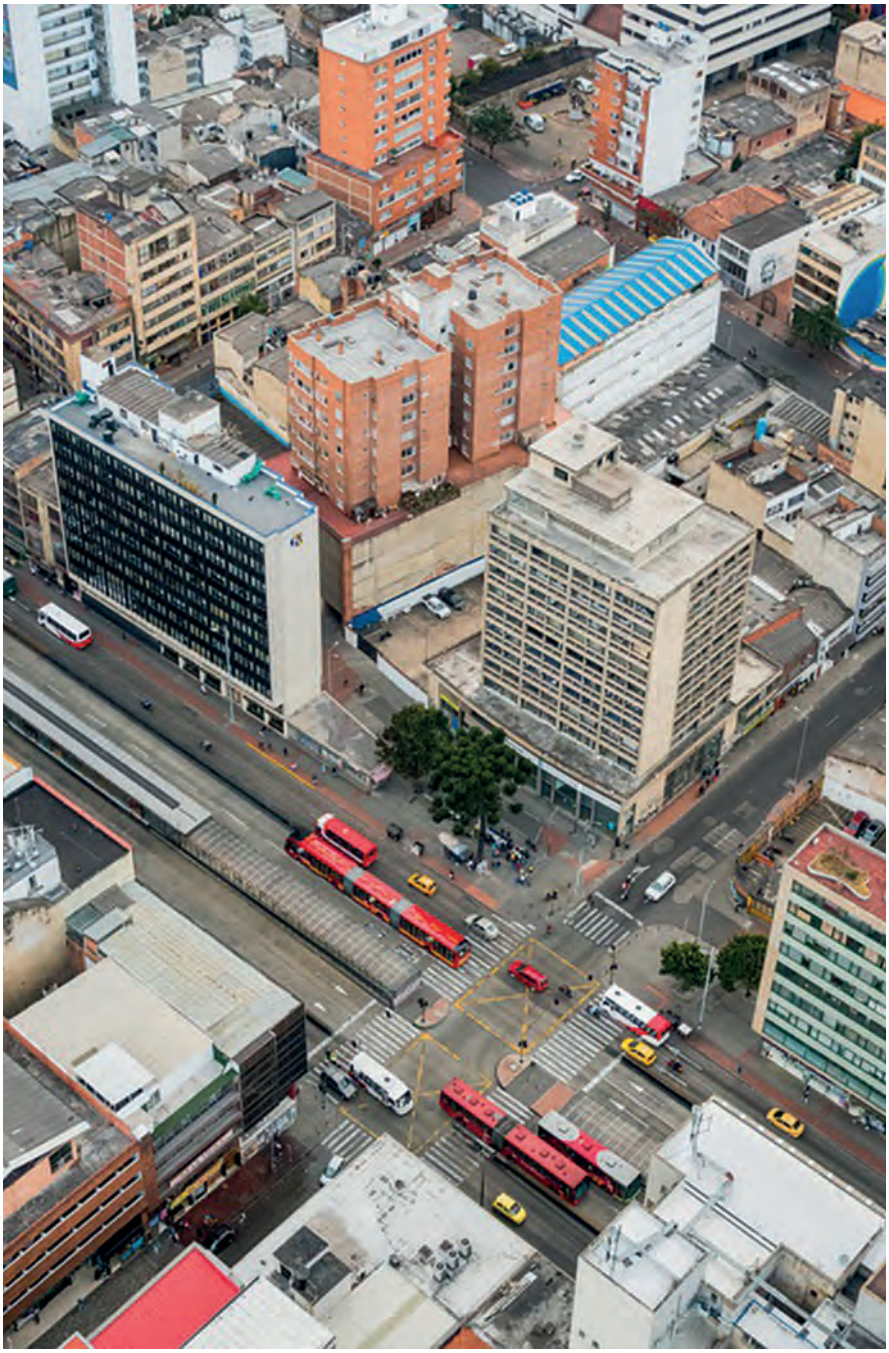
Located in the geographical center of the country and with an approx. population of 8m inhabitants, Bogotá is the capital and largest city of Colombia. In recent years, the city has been characterized for being a landmark of urban and mobility renewal in Latin America, setting out ambitious projects such as TransMilenio, Transmicable (Cable car), and developing and extensive cycling infrastructure.

At the time of going to press, the city has received six formal applications from private operators (Lime, Grin, 11:11, Grupo Sánchez Barrios, Movo y Muvo) interested in providing the service and the city is currently revising the documentation. This regulatory approach shows the city's commitment in overcoming the initial concerns as to the implementation of e-scooter schemes, as well as its desire to integrate them as an option to improve the city's urban mobility.

The latest actions taken by the BRT company TransMilenio, prove the effort to integrate new mobility services with traditional public transport. In August 2019, TransMilenio decided to sign an alliance with the company Grin to provide citizens using line K along El Dorado Avenue with e-scooters to complete their trips. The e-scooters are parked just outside the stations and the users must start their trip once they have crossed the pedestrian bridges over the wide avenue. The alliance shows the city's willingness to become

## TransMilenio

TransMilenio is the bus-based mass public transport system of Bogotá. It is a Bus Rapid Transit system (BRT), which is a type of mass public transport that operates on road level within its own lane. As of today, the system counts 114km of main lines distributed in 12 lines, 134 stations and nine passenger distribution HUBs. The bus fleet counts approximately 2850 units distributed in bi-articulated, articulated and regular buses that feed the system.



**Newest TransMilenio line at Av 10th**

***In August 2019, TransMilenio decided to sign an alliance with the company Grin to provide citizens using line K along El Dorado Avenue with e-scooters to complete their trips.***

a leading example of new mobility services integration in Latin America, as this is the first project of its type in the region and one of the first in the world.

### AN UNCERTAIN FUTURE

The ongoing mobility transformation process of Bogotá is still reflected in its innovative solutions along the last two decades, from TransMilenio to e-scooters the city has shown a resilient spirit to overcome the most burdensome situations posed by an unsustainable urban mobility context at the end of the 20th century. Above all, the city keeps facing enormous challenges to its urban mobility future. The construction of the first metro line in 2020 will start releasing pressure to a BRT system that cannot move the high flows of passengers generated in the city every day by itself. Meanwhile, initiatives such as alliances with new mobility services companies and a positive and comprehensive approach towards different mobility solutions will keep the city at the forefront of urban mobility in the region.

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# The city that said yes to tolls

The number of daily bike trips in Trondheim has increased from approximately 32,000 to 54,000 after Greener Trondheim began building infrastructure. Picture taken at Bakklandet near the town centre.

Photo: Knut Opeide, Statens vegvesen

**Hans Kringstad** and **Lacie Goff** examine Trondheim's long-standing relationship with toll roads and how the city's current strategy includes literal, rather than political or financial, shortcuts

Trondheim, Norway is a unique city. The city's politicians have cut car traffic and increased environmentally friendly travels without political uproar. Meanwhile, the three other major Norwegian cities are experiencing strong pushbacks with aggressive campaigns led by a political party whose entire platform is based on saying no to toll money.

So, what is it with Trondheim that sees its citizens so supportive of tolls? Two important reasons have led to peace and tolerance in this northern city.

First of all, Trondheim was a forerunner with Greener Trondheim, a collaboration project where motorists contribute financially to measures that aim to recruit more people to walk, bike and use public transportation. Secondly, the inhabitants saw concrete results and they saw them quickly. New bike lanes, better and more affordable bus options, safer school routes and even new motorways that freed up bottlenecks and areas prone to traffic jams.

Politically, however, this starting point was hard. Mayor Rita Ottervik took down the city's old toll system in 2005, promising to never again implement tolls for motorists. Just three years later, the city council implemented Greener Trondheim... and new tolls. Since that time, Ottervik has been re-elected mayor three times.

The broken promise to never again reinstate the tolls can be attributed to the Parliament's ruling for a climate agreement with the goal of making Norway carbon neutral within 2030. To make this goal more enticing, the state offered money to cities who were willing to cut their transportation emissions, and this financial support was essential for Trondheim to be able to build new infrastructure. Each year the number of inhabitants was increasing by 3000, and motor traffic grew in such a way that the city couldn't afford to solve these problems on its own.

## GREENER TRONDHEIM IS BORN

The result was a collaboration with the Norwegian state, the region of Trøndelag and the municipality of Trondheim. Put simply, Greener Trondheim works in practice that for every NOK 1 million (€99,000) motorists pay in tolls, the city gets a NOK 1 million extra from the Norwegian State to use on transportation.

To fuel this, the State has implemented a requirement stating that the city's private motor traffic is not to increase, even though Trondheim's population increases each year.

> ***In Bergen, Norway's second largest city, a new political party against tolls scored highest in opinion surveys before the most recent municipal elections. In the Stavanger area, the party received 9 percent of the vote. In Trondheim, the party didn't even exist***

Therefore, all of these extra trips need to be taken by walking, biking or collective transportation. In order to achieve this, Greener Trondheim relies on a system of penalty and reward. The rewards include a better collective transportation network and better infrastructure for cyclists and pedestrians. The restrictive measures, or penalties, for motorists are first and foremost tolls, but also parking limitations and the conversion of motorist lanes into bus lanes.

The first restrictions came in 2008 when the buses got their own lanes through the city centre, which meant an increase of cars in the other lanes. In the beginning the protests were plentiful and the pessimists predicted queues and chaos in the city centre. But with a more attractive bus offering, it quickly became evident that more people started bussing, removing unnecessary motorists from the roads and allowing both cars and busses alike to get from A to B faster. Today, surveys show that an overwhelming majority are in favour of Trondheim's bus lanes.

Trondheim's tolls first sprouted up in 2010. Previously the majority had been against needing to pay a fee to be able to drive in and out of the city, but these opinions changed gradually over time. Even though the toll system was widely expanded in 2014, it didn't take long before the majority of those surveyed answered that they were in favour of the tolls. The latest survey in 2018 showed that 49 percent were positive and only 30 percent were negative.

While positivity increased in Trondheim, strong opposition was growing in other, similar cities in Norway. In Bergen, Norway's second largest city, a new political party against tolls scored highest in opinion surveys before the most recent municipal elections. In the Stavanger area, the party received 9 percent of the vote. In Trondheim, the party didn't even exist.

### GREENER TRONDHEIM: AN OVERVIEW

When Greener Trondheim was established in 2008/2009, the politicians put into effect 10 concrete goals to be reached by the end of 2018. The two first goals were:

- To reduce greenhouse gas emissions from transport by at least 20 percent
- To reduce the share of trips taken by car from 58 percent to 50 percent

Greener Trondheim has succeeded with both. Emission reduction is attributed to a boom of electric cars and the blending of biofuel into diesel. Without the actions of Greener Trondheim, that is if people travelled the same way as before while the population increases each year, it is estimated that the city would see 60,000 more car trips each and every day.

Since 2010 approximately half of the funding from Greener Trondheim has been used on main roads, and the other half on collective transportation, cycling, pedestrians and traffic safety for those who are most vulnerable. The project also works directly with companies and schools to encourage people to choose greener commuting methods to and from work and school.

## Results in numbers

- Car traffic in Trondheim has not increased since 2010 and has actually gone down within the toll areas. Personal car travel has been reduced from 58 percent to 50 percent.
- The use of collective transportation has increased by 70 percent. The bus is now the most widely used local transportation method.
- Biking has increased by 70 per cent, making Trondheim the city in Norway with the highest percent of cyclists. The latest survey shows that 10 percent of the city's entire population chooses transportation via bike, despite the city's many hills and rugged, shifting climate during the winter.
- The percentage of pedestrians in the city as a whole remains quite stable according to transportation surveys, but manual counts suggest that 40 percent more people travel by foot to and from the city centre now than in 2010.
- Biking to elementary schools has drastically increased, and car trips have decreased accordingly. One of the most important measures here has been the removal of a rule that children could not bike to school before the fifth grade. Greener Trondheim's mobility advisors have followed up closely with the city's schools, offering traffic safety training, free bike reparation days, better bike parking at school and other encouraging methods.

24-meter long buses have become a part of Trondheim's cityscape since August 2019. The new bus system makes it possible to increase the use of collective transportation in the years to come.

Photo: Hans Kringstad, Greener Trondheim


Photo: Knut Opeide, Statens vegvesen

Then-Prime Minister Jens Stoltenberg and the minister of transportation Marit Arnstad opened the first red bike lanes in Trondheim in 2012.

So, what exactly is Greener Trondheim and what do we do? Here's a brief look at the various project areas Greener Trondheim works with.

## MAIN ROADS

One example of a measure that has been implemented here is the expansion from two to four lanes on the highway leading from the south of Trondheim to the neighbouring municipality. Building roads is a risky endeavour because it can make driving more attractive, but at the same time, eliminating bottlenecks in traffic is crucial for lowering emissions and can have re-routing effects that benefit the city as a whole. In the aforementioned example of road expansion one such bottleneck was removed, giving commercial vehicles and semi-trucks a more efficient route where they no longer needed to drive via the city centre in order to reach the warehouse terminal.

## COLLECTIVE TRANSPORTATION

The primary intention of Greener Trondheim is to build new constructions, but the project can also supply money to operations and maintenance. Collective transportation throughout the city now receives around NOK 200 million each year which helps fund more frequent bus routes and lower ticket prices, amongst other benefits. At the same time as tolls were implemented in 2010, Greener Trondheim contributed funding to expand the bus route network. In addition, the price of a bus card was reduced by 14 percent to 54 percent depending on ticket type, all of which resulted in an immediate increase in the use of bus transportation.

## "METROBUSS"

In 2019, Trondheim radically changed and expanded the city's bus system. The busses now operate within a tighter network system (referred to as "Metrobuss") which requires more people to transfer buses during their trip, but which also drastically increases the capacity of the system. Increased bus capacity is essential for ensuring that personal motor traffic does not increase, and before this restructuring, the capacity of Trondheim's bus system was reaching overload. Greener Trondheim builds infrastructure for "Metrobuss" for a total of roughly NOK 3 billion (€293m), including stations and transfer points along the main lines. The state covers half of the expenses and the rest comes from toll money. The new metro system includes a modern and environmentally friendly bus fleet with 300 vehicles, of which 58 are 24-meter long "metrobuses."

## BIKING

Since 2010, Greener Trondheim has built 41 kilometres of new bike lanes. This includes nine bridges which help to connect the many parts of the city together, and Greener Trondheim is constantly working to create a coherent network of bike lanes throughout the city. But space in the city centre is limited, and finding good solutions for both cars, buses and bikes in the same streets is challenging. As a means of acknowledging the importance of good biking alternatives, Norway's Prime Minister at the time, Jens Stoltenberg, opened the first red bike lanes in the city centre in 2012.

## PEDESTRIANS AND TRAFFIC SAFETY

Greener Trondheim prioritizes pedestrians, which account for nearly 30 percent of all trips taken in the city. A specialized pedestrian-focused group is dedicated to mapping, planning and building shortcuts throughout the town. These shortcuts are paths that can save one anywhere from 1 to 16 minutes or more when walking from A to B, thus making walking a more attractive transportation alternative. Over 500 paths are mapped out including the so-called 'elephant paths' or 'desire paths' (paths and tracks made over time by people to go from A to B in a faster way if there is no designated footpath), and so far, 40 of these have been completed. Here the work includes installing good lighting, adding handrails where the paths are

Festningen shortcut before...

...and after


**All of Greener Trondheim's pedestrian shortcuts are marked as seen here.**
*(Photo by Knut Opeide, Statens vegvesen)*

Sigurd Bergs *alle* shortcut before...

...and after

## "Byvekstavtalen" (the city-growth agreement)

- In 2019 Greener Trondheim was expanded through the city-growth agreement with the Norwegian state, and the Greener Trondheim project was extended until 2029.
- The project now includes three additional neighbouring municipalities, in addition to Trondheim itself.
- The state contributes roughly NOK 8 billion extra.
- Greener Trondheim has used approximately NOK7 billion since its start in 2009, and now has approximately NOK 18 billion for the period 2019-2029.
- Roughly half of the funding comes from the state, 40 percent comes from tolls and 10 percent from the region and municipality.
- In return for this funding, the state requires that the total amount of motor traffic in this area does not increase, even though the population is set to increase each year. This means that all those extra trips need to be taken with walking, biking or collective transportation.

steep and laying good asphalt to make the path easy to use and easy to plough for snow in the winter. Many of these shortcuts lead to schools, which has led to 16 of the city's schools now having a safer school route for the city's children.

### "HJEMJOBBHJEM"

The mobility advisors at Greener Trondheim are responsible for the measures that focus on communication and psychology. They work as a supplement to the physical side responsible for infrastructure and construction. The mobility advisors work directly with companies and schools to encourage and facilitate for the employees and students choosing greener means of commuting.

One of the projects the mobility advisors have recently launched is "HjemJobbHjem," which translates to HomeWorkHome. This is a pilot project set to last until June 2020, and based on the results, could become a permanent offering from 2021. In "HjemJobbHjem" companies sign themselves up to participate and their employees receive a large package of goods and services in exchange for the company implementing restrictions on their employee parking policy. This bases itself on the research that shows that free parking at work is one of the biggest barriers for greener commuting to and from work. Some of the goods that employees of participating companies receive include a discounted ticket for collective transportation (bus, tram and train), e-bike loaning, free bike-reparation days, a reduced rate for the city-bike pass and assistance to test winter biking with a free set of spiked tires.

More work commutes by bike and on foot gives better public health, less traffic, more available capacity on buses and healthier employees. Good for the employer, good for the employee, and good for the city as a whole.

Greener Trondheim will continue for at least another 10 years, and we're excited to see what we can accomplish.

**FYI**
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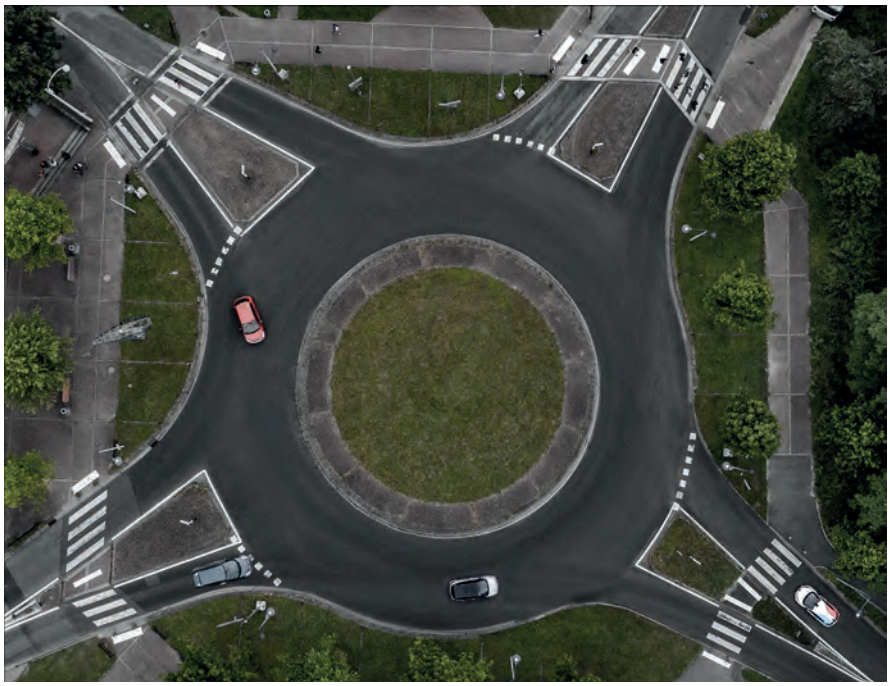
# Self improvement

The Metropolitan area of Rouen Normandy in France is the host of a *première* in Europe! The metropolitan authority, in cooperation with a group of local and national partners, is testing a service of on-demand automated shared cars in an open urban road environment. **Thomas Mourey** reports



**Madrillet roundabout in Saint-Etienne-du-Rouvray, in Rouen metropolitan area. The automated vehicles operate in an open urban road environment**

Located in the Seine Valley between Paris and the seafront of Le Havre, the Metropolitan area of Rouen Normandy is home to approximately 500,000 inhabitants, spreads over a territory of 664 km$^2$ and is made up of 71 municipalities, among which Saint-Etienne-du-Rouvray is hosting one of the most innovative trials of automated vehicles in Europe.

While tests of automated shuttles are implemented in an increasing number of locations, Rouen Normandy Autonomous Lab has been innovative and introduced a new concept in Europe: a combination of on-demand car-sharing system with automation technology.

The test is implemented by the sconsortium of Rouen Normandy Autonomous Lab that includes local and regional authorities, namely Rouen Normandy Metropolitan authority and the Normandy region, as well as a vehicle manufacturer (Renault), an operator (Transdev Rouen) and an insurance group (Matmut) with the support of financers (Caisse des dépôts and the European Union's ERDF).

## INNOVATION IN PRACTICE: THE CONCEPT

In Saint-Etienne-du-Rouvray, only a few kilometers away from Rouen city centre, five automated vehicles operate on three defined routes. Since September 2018, registered participants can call one of the vehicles via a dedicated app. The vehicle comes and picks the passenger at one of the 17 stops and transports him/her to the stop selected by the passenger.

**The automated vehicle can be ordered directly via a mobile app**


*Photos: @RouenNormandyAutonomousLab*

What makes the test in Rouen even more innovative is that the automated vehicles operate in a completely open environment where they must deal with interactions with other vehicles and road users. In addition, the vehicles drive at a typical urban transport speed, up to 30km/h..

## DRIVERLESS, REALLY?

During the test, and because of the strict legislation, a 'safety driver' is present in all vehicles, at all times. The role of this operator is to ensure a human control over the vehicle in case of technological failures or problems. In the future, new legislations are expected to allow vehicles to drive *without* any human on board. Human supervision is also ensured by an operator in a remote control centre.

In addition to the human presence, connectivity is key for the success of such a project. In Rouen, vehicles are making use of a complete set of on-board technology devices (e.g. sensors, radars, lidars) which can detect obstacles placed on the road or road users moving near the vehicle. This technology is complemented with a continuous communication flow with elements placed on the test routes which provide further information to the system (e.g. a camera can inform the vehicles on the presence of pedestrians on a zebra crossing). This communication between the vehicles and the environment is key to ensure that cars and shuttles operate safely.

## AUTOMATED VEHICLES: WHAT FOR?

This demonstration is highly innovative and is also an example of how local authorities can use automated vehicles to provide relevant mobility services in different parts of urban areas.

The Rouen Normandy Autonomous Lab vehicles operate in a part of the metropolitan area where public transport is not necessarily adapted, particularly because of the lower demand. Indeed, the test site includes a technology campus with universities and innovative companies, a shopping area and a more residential part.

Therefore, a fleet of a few vehicles has been adapted to this type of environment and the related lower demand. In addition, the on-demand operation allows to provide a service that answers a specific transport need. Additionally, the use of automated vehicles has the potential to decrease the operational costs and to propose a service for a longer time period (and potentially non-stop). However, during the test phase, the service is available only between 08:00 and 18:00.

> ***Rouen Normandy Autonomous Lab has introduced a new concept in Europe: a combination of an on-demand car-sharing system with automation technology***

The local authorities and operators see the service as a complement to the existing public transport offer. The vehicles drive on three pre-defined routes connected to the main tram station which link this neighbourhood with the centre of the metropolitan area. Then, the transport within the neighbourhood is ensured by the Rouen Normandy Autonomous Lab vehicles. The fact that the vehicles transport passengers on these three routes also allows the authorities to keep a control on the area covered by the service and to maintain it in an area that needs a transport service.

Additionally, the four Renault Zoe cars and the automated shuttle that are used by Rouen Normandy Autonomous Lab are all running on electricity and have therefore a limited impact in terms of emissions and noise pollution.

## HOW DOES IT FIT IN THE MOBILITY STRATEGY?

To decrease the dependency of local residents on the individual car, the Metropolitan authority of Rouen has built a mobility strategy on five main pillars. Rouen Normandy Autonomous Lab responds to the focus of these five pillars:

- **Change the concept of public transport by introducing automated vehicles.** The metropolitan authority believes that the introduction of automated mobility can be a revolution in public transport and be beneficial for the society. The conditions for a positive and meaningful transition include the use of zero-emission vehicles, the fact that vehicles are shared




and finally the operation of the automated car-sharing system in relation with a public transport scheme. These conditions are all met by the Rouen Normandy Autonomous Lab project.

- **Decrease the carbon and environmental footprint of mobility.** The Rouen Normandy Autonomous Lab project uses electric vehicles which do not emit (locally) greenhouse gases and pollutants. In addition, by linking the service to public transport, it encourages residents to use sustainable multimodal solutions. It therefore has the potential to contribute to the improvement of local public health and global climate change.
- **Free public space up and reconquer it.** Shared mobility is at the core of the Rouen Normandy Autonomous Lab project. Car-sharing can decrease the car-ownership rate and the total number of vehicles in the city. Less vehicles means less space used for parking and road operation, which can be re-allocated to other modes, including active mobility and public transport, and to other activities. In addition, automated vehicles don't need to park close to the final trip destination as they can drive to a parking place located in a more relevant place or directly drive to pick up the next passenger – and therefore free up some additional space.
- **Interoperability and IT solutions.** The Rouen Normandy Autonomous Lab is strongly relying on IT solutions for the on-demand transport solution it provides. In addition, by linking the automated car-sharing service to the tram network, the project encourages interoperability, between modes. This concept could fit in a wider mobility service offer, and potentially be integrated in a future MaaS scheme.
- **Foster innovation and accompany changes.** The Rouen Normandy Autonomous Lab fits perfectly in the vision of the metropolitan authorities for fostering innovation. The test period allows to trial a technology, to improve a mobility service and to adapt it to the local context. In addition, the demonstration allows residents to get familiar with the solutions and facilitates the introduction of permanent services.

***This demonstration is highly innovative and is also an example of how local authorities can use automated vehicles to provide relevant mobility services in different parts of urban areas***

**Above: Human supervision and connectivity are key to ensure a safe implementation of the demonstration activities**

**Below: Autonomous vehicle at Rouen Normandy Autonomous Lab facilities**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# Environment and Health

This section looks at the impact that urban and regional mobility has on the environment and on health, and how the adverse impact can be reduced

- Lisbon – A city putting pedestrians first
- Paris – Combatting rising air pollution levels
- Cycle Highways – Planning and designing the perfect bike lane
- Milton Park – Changing mobility behaviour at business parks



# Walk the walk

A strategy for Pedestrian Accessibility in Lisbon by **Pedro Homem de Gouveia**

Picture a city born over 2,500 years ago, with seven steep hills and streets filled with cars. With narrow sidewalks made of slippery cobblestones, where abusive parking is chronically tolerated. Picture a moment when legal accessibility standards have been ignored for over a decade, City Council is being crushed by debt, and the world is reeling under a financial crisis. A fine day to start a Pedestrian Accessibility Plan, is it not?

Finding an excuse to do nothing about Pedestrian Accessibility is easy. As we kicked off the planning process, naysayers used the full repertoire: topography, heritage, 'we don't have the money' or 'we do have the cars', politicians had no will and pedestrians no discipline. Clearly, the first barrier we had to overcome was scepticism.

## NOT AN UPHILL BATTLE

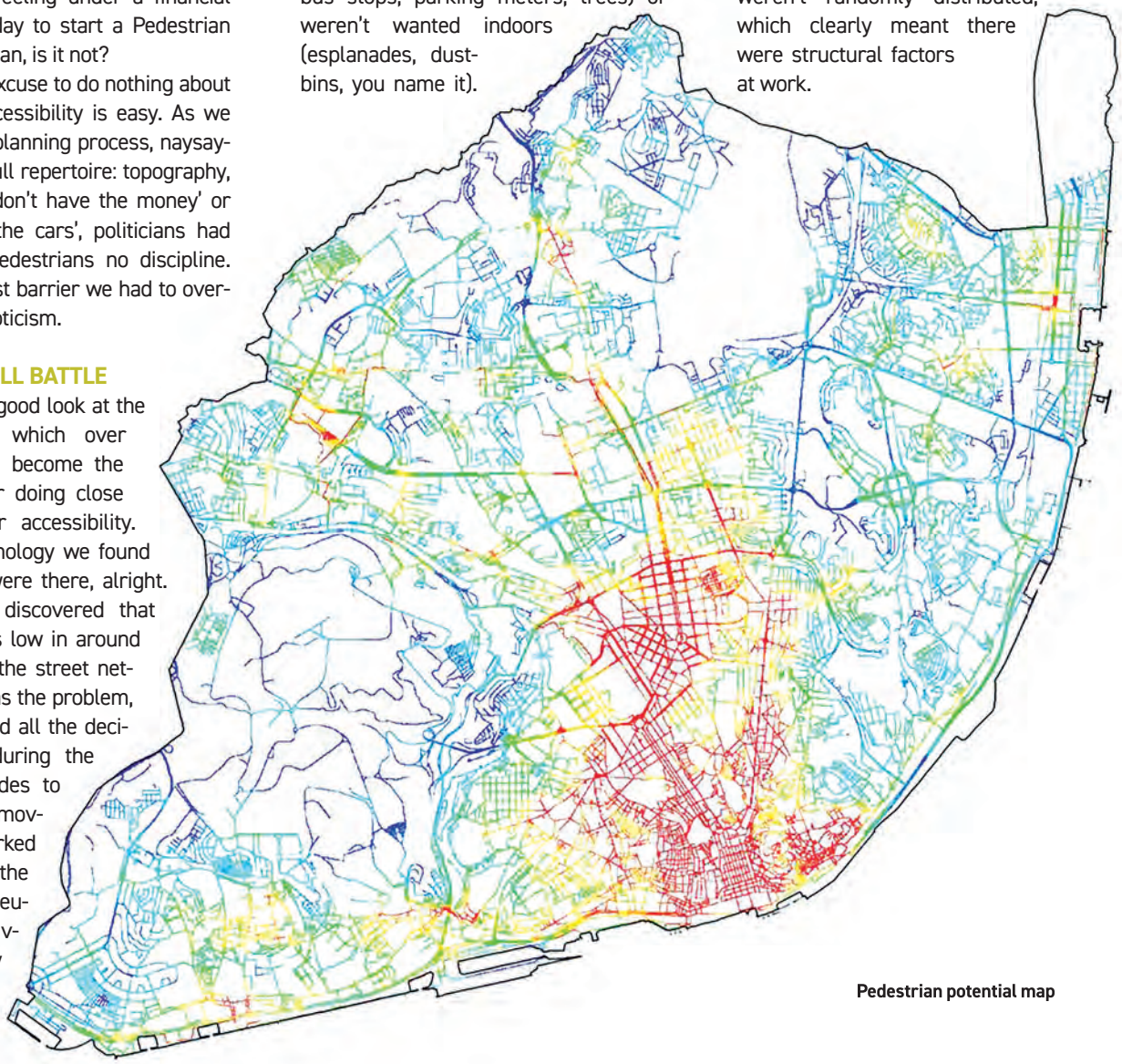
So, we took a good look at the famous hills, which over the years had become the key reason for doing close to nothing for accessibility. With GIS technology we found out the hills were there, alright. But we also discovered that inclination was low in around 75 percent of the street network. What was the problem, then? Cars, and all the decisions made during the previous decades to accommodate moving cars, parked cars, and all the extra manoeuvring space drivers supposedly needed to be "on the safe side".

The sidewalks were narrow, but that wasn't an act of nature. They were the leftovers, after most of the available space had been carved out for exclusive use of motorized vehicles. They were poorly maintained and were filled with obstacles. They had become a storage room for all the things that couldn't be in the carriageway (traffic signals, bus stops, parking meters, trees) or weren't wanted indoors (esplanades, dustbins, you name it).

Crosswalks weren't in a good shape, either – very few were step-free, none had tactile paving, and traffic signals were timed for running, not walking.

## OVERCOMING THE BLAME GAME

For the second myth-busting expedition, we collected and analysed GIS data on pedestrian crashes. These crashes weren't randomly distributed, which clearly meant there were structural factors at work.



Pedestrian potential map

***The problem was cars, and all the decisions made during the previous decades to accommodate moving cars, parked cars, and all the extra manoeuvring space drivers supposedly needed***

The data also showed that much of the 'established wisdom' on this topic was nothing short of victim-blaming prejudice. Were pedestrians being hit because they didn't use the crosswalk, or crossed against the red? Not really. More victims were hit on the crosswalk or its immediate vicinity than anywhere else, and there were always more victims caught when crossing with the green for pedestrians. And it was heart-breaking to find out that over one third of all fatal and serious victims were elderly citizens – not the "irresponsible teenagers" many talked about (not that that would make it any better), but simply people who have limitations walking, seeing and listening. They were the most vulnerable, and their disproportionate victimisation clearly showed that this wasn't a question of 'disciplining' pedestrians.

## THE REAL CHALLENGE

How did we get here, and how could we get out? A large participatory session got the City's public space and traffic officials working together with community organizations from various sectors: Disability, Child Safety, Pedestrians, Automobile Club, Public Transport Operators, and more.

We started by asking what they thought were the biggest obstacles to making Lisbon accessible and safe for pedestrians. We were expecting the lack of money to poll way ahead. Well, we were in for a surprise. The four key obstacles were (1) we treat pedestrians as secondary, (2) there is no political commitment, (3) the City doesn't set an example, and (4) inefficient management and oversight.

These problems were all connected and this opened up a whole new strategic outlook. Our main challenge wasn't physical change, but organizational change.

It wasn't about scheduling investment over a 20-year period to adapt over 9,800 crosswalks, 2,000 bus stops and 1,725 linear km of sidewalks. Nope. It was about making sure that the countless decisions being made every day about those elements, by various departments and officials, at various scales and for different purposes, were all compatible with pedestrian needs. It was about preventing more mistakes and making sure no opportunities were wasted – quite an appealing challenge, in times of shortage.

The organization that had created most of the problems had to be converted into a pedestrian-accessibility-machine. For that, we devised a strategy based on the following principles:

**1. Clear and operative political commitment**

Political will – important to have, but not enough in broad strokes. It had to be converted into clear guidelines where technical officials could find guidance (and cover) for day to day dilemmas – for example, do we choose safety over traffic speed, flow, or parking? Moreover, coming up with a full-fledged budget in times of crisis was not only useless (we didn't have the money, anyway), but could actually be counterproductive, fuelling scepticism. So, City Council made a simple decision: every year, 3 percent of the

***The 'established wisdom' on pedestrian accidents was nothing short of victim-blaming prejudice***

budget for public works would be invested in pedestrian accessibility. Very easy to approve and verify.

**2. Research and design models**

Of course, crosswalks should be safe and accessible… but what does that mean, and how should it be done? There were no detailed standards for crosswalks, bus stops, sidewalks and traffic calming measures. We found lack of clear design guidance to be a major source of resistance to change from technical officials – people wanted to do the right thing, but needed clear, reliable and formal rules to follow. So we developed design models through good practice reviews and user testing, always looking for solutions that were easy to understand, design, build and verify on-site. The easier it is to do it right, the bigger the chances it will be done right.

**3. Play like a string quartet**

Centralizing responsibility in one Council member or department would have "made sense", but it would also have the perverse effect of letting everybody "off the hook" feeling like it wasn't really "their" responsibility. Everybody wants coordination, of course, but centralization is only one way to coordinate, and very often not the most practical one. There was a lot to be done, and many opportunities to take advantage of. We had to multiply the hands on deck. So instead of trying to climb into the shoes of an orchestra conductor, we chose to write music pieces for various quartets to play by themselves, with no conductor. We do have a planning team, but this team works as a dynamo – it provides advice, training and tools, helps build public support, and leads by example.

**4. Teach a man to fish…**

Capacity building is a cornerstone of our strategy. But it's not enough to provide manuals and some training. Tools, practical advice, in-house consulting and technical support must be available as well. If a designer is wondering about the safety of a site, a common web browser should be enough to access the GIS crash database. If a borough president is holding a public session with residents to present a traffic-calming project, expert know-how should be shared in a high-quality presentation. And technical support should be provided throughout the whole design process, right from the first site inspection – and not imposed after all is designed.

**Before: Long crossing distances are risky for pedestrians and inconvenient for traffic management**

**After: Bottlenecks prevent abusive parking and make it easier to balance cars and pedestrians**

**5. Infrastructure. Period.**

All our communication and training materials treat the pedestrian network as it deserves to be treated: a transport infrastructure. Cities must make sure that, like the infrastructure provided to other modes, this one also responds to the functional needs and safety requirements of its users, including its most vulnerable ones. Nobody would accept an airport runway being too short, or a railway line with "just a few" rails missing, much less holes in the asphalt. We must cultivate the exact same attitude with sidewalks, crosswalks and bus stops that millions of pedestrians use every day. Making it so must be made

***As you work to understand and respond to pedestrian needs, you enter the real world. You understand, for example, that a pedestrian and a public transport passenger are one and the same person***

**Before: A sea of asphalt separated the Benfica train station from the area it served, and made crossing on foot very dangerous**

**After: all areas not indispensable for car movement were converted to improve safety, functionality and comfort**

the responsibility of many, since walking is not a "special" mode – it's the most basic of all, and the essential building block for any sustainable mobility policy.

**6. Don't stop the music**

As you work to understand and respond to pedestrian needs, you enter the real world. You understand, for example, that a pedestrian and a public transport passenger are one and the same person, who often spends half the duration of a bus trip walking and waiting at the bus stop. You see traffic calming as an instrument for bringing life back to the streets and endorse Vision Zero as an opportunity for promoting Sustainable Mobility. And you connect with the urgency of making public space and public transport safe for women. We chose not to stop at tactile paving and putting in zebra stripes. We had to carry on. The pedestrian experience is a continuum, and we had to address it. Now, after years of hard work, we're no longer the disability people. We've become user experts. The People's people. Quite a fitting tribute to the founders of Universal Design...

**FYI**

The Pedestrian Accessibility Plan set Lisbon's strategy to become accessible and safe for all pedestrians. Started in 2009, today it covers 8 operational areas: public space, public buildings, public transport, building permits, tourism, elections and housing.

**Pedro Homem de Gouveia** coordinated its development and implementation at the City of Lisbon, where he also kick-started the Vision Zero Plan. He is now at POLIS, coordinating the working groups for Governance & Integration, and for Safety & Security.

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# Laser focused on a cleaner tomorrow

*"No problem can be solved from the same level of consciousness that created it."*

Albert Einstein could have been referring to transport's contribution to rising air pollution levels, as **Yolla Hager** and **Allison Kelly** discuss

Cities around the world today are facing a real crisis due to air pollution and climate change. Carbon dioxide, the main contributor to climate change, which is produced through the burning of fossil fuels, makes transportation a major source of air pollution in cities around the world. In Europe alone, 800,000 people die annually due to air pollution.[1]

According to the European Parliament website, "transport is responsible for nearly 30 per cent of the EU's total $CO_2$ emissions, of which 72 per cent comes from road transportation."[2] Studies have shown that if policies stay the same air quality goals will not be met.[3] Many cities in Europe today face fines due to air quality breaches above Euro standards. Cities must intensify their efforts to find

EDAR on gantry in Paris

***Many cities face fines due to air quality breaches above Euro standards. Cities must intensify their efforts to find an immediate solution that is effective and can provide instantaneous results***

an immediate solution that is effective and can provide instantaneous results. As with any issue that needs to be solved, the matter must be studied and based on facts, not predictions! The only effective way to solve this predicament is to continuously monitor and regulate vehicles on the road in real time.

## HOW CAN EUROPEAN CITIES DELIVER ON AIR QUALITY PROMISES?

Diesel related pollution from vehicles is an invisible killer that needs to be addressed with realistic facts to find an effective solution. The focus should be on more accurate on road, real world emissions measurements; such as, Market Surveillance and In-service Conformity checks as recommended by the European Commission rather than laboratory type approvals and Euro Standards. Remote sensing technologies like EDAR have the capability of providing a cost-effective, large sample size of vehicle emissions records for fleet screening applications in real time. As referenced in a recent ICCT report, "this data would provide valuable emissions information to authorities and would help in the identification of vehicle models with poor or suspicious real-world performance. This could then direct the more rigorous, and costly, measurement methods such as PEMS and chassis dynamometer testing as part of market surveillance programs. Similarly, the short- and long-term effectiveness of, for example, promised emission improvements can be tracked over time. In addition, remote sensing can be used to identify high-emitting vehicles, detect individual tampering, and encourage proper maintenance of vehicle emission control systems."[4] Remote sensing technologies, such as EDAR, can also provide important information such as $NO_x$ measurements, which is

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not available at this time in smog stations throughout Europe due to capabilities being fairly limited and cost prohibitive. In an attempt to mitigate vehicle related pollution, cities are implementing Low Emission Zones (LEZ) and Clean Air Zones (CAZ) that have been found to be ineffective.

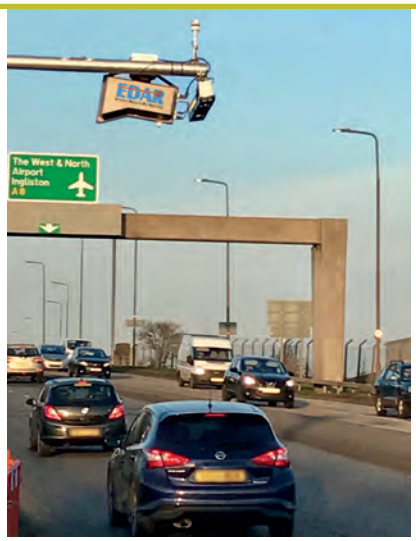
## WHERE ARE CURRENT AIR QUALITY PROPOSALS FALLING SHORT?

Establishing regulations for air quality based on laboratory settings without real world data confirmation is the main reason that air quality proposals fall short. A recent El Pais article quoted Nuria Blázquez, the transportation coordinator of the environmental group Ecologists in Action, stating, "the main problem is that there is no clear 'legal definition' of what is a low-emissions zone. The term could be applied to areas with strict restrictions or those with very little effectiveness. That is the case, for example, in German cities, where there are only restrictions against the oldest vehicles, and there has been no change [in pollution levels]."[5] Recent air quality initiatives, such as low emission zones, are based on Euro emissions standards and as on road remote sensing studies have shown Euro emission standards are extremely unreliable.

For example, the TRUE Initiative Paris Report shows using data from EDAR that "on average, $NO_x$ emissions from Euro 6 diesel cars in Paris are elevated relative to most petrol cars measured in the study. The mean distance-specific $NO_x$ emissions of Euro 6 diesel cars are 4.8 times the emissions of Euro 6 petrol cars, and only 18 per cent lower than the emissions of the oldest (Euro 2) petrol cars."[6]

## ARE LOW EMISSION AND CLEAN AIR ZONES AN EFFECTIVE SOLUTION?

At this time LEZs and CAZs limit the number of vehicles entering according to Euro Class allowing only newer vehicles into the LEZ, which is a highly




**EDAR on a multi-lane road in Scotland**

discriminatory system based on the ability to buy a new car. As studies have shown from real world emissions testing not all cars, whether diesel or petrol, emit equally. Restricting vehicles according to Euro standards has been proven in real world studies to be ineffective and unfair due to the fact that well maintained vehicles of most euro classes can be as clean as newer vehicles. In the past, the only technological choices available to cities for monitoring their fleet were license plate recognition cameras.

Today, cities have the option to use remote sensing technologies that offer a means to cost effectively, screen large amount of vehicle in a short amount of time, while identifying clean or dirty vehicles on the roads in real time. With this type of information, governments can enforce LEZs and CAZs according to the emissions vehicles are actually emitting. Using remote sensing to continuously monitor will allow governments to perform In-service Conformity Checks and Market Surveillance by enforcing the following measures:

- Governments can set "cut points" that will help identify the cleanest and dirtiest vehicles in their fleet by monitoring vehicles driving habits over time.
- After the clean vehicles have been identified on road a number of times, a list can be published on a government website allowing these vehicles to enter the LEZ regardless of euro class without penalty therefore rewarding the

***Establishing regulations for air quality based on laboratory settings without real world data confirmation is the main reason that air quality proposals fall short***

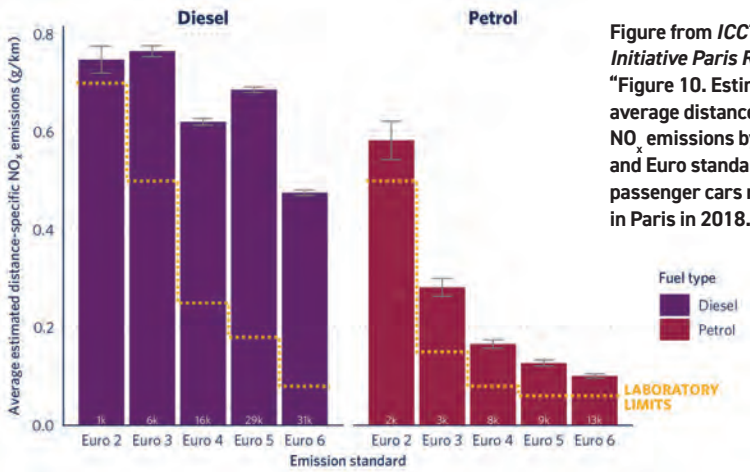



**Figure from *ICCT TRUE Initiative Paris Report*: "Figure 10. Estimated average distance-specific $NO_x$ emissions by fuel type and Euro standard for passenger cars measured in Paris in 2018."**

# POLIS

CITIES AND REGIONS FOR TRANSPORT INNOVATION

## ANNUAL CONFERENCE 2019

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> ***Governments that apply measures using real world data through the use of remote sensing will be able to implement valid and fair Clean Air Zones while promoting positive behaviour among motorist***

cleanest vehicles on road; which will incentivize positive behavioural change among motorist.

- Identify high polluters on the road and direct them to a car test station for further evaluation.
- Anti-tampering campaign that identifies vehicles or trucks with malfunctioning or disabled diesel particulate filter (DPF) and selective catalytic reduction (SCR) systems or depleted AdBlue.
- True assessment of complementary emissions reduction programs, such as retrofits or scrappage, can be evaluated effectively overtime therefore identifying the degradation of the retrofit components in real time.
- Help cities to forecast their next air pollution warning during hot days.

In summary, governments that apply these measures using real world data through the use of remote sensing will be able to implement valid and fair Clean Air Zones while promoting positive behaviour among motorist.

## HOW CAN REMOTE SENSING DATA HELP CITIES WITH AIR POLLUTION?

Remote sensing can provide a statistically significant, cost effective data set that will ultimately assist with future policies and regulations, as well as emission and mitigation strategies. According to Yoann Bernard of ICCT, "cities that urgently need to tackle air pollution from [the] transport sector, need to base their policies on real-world emission evidence for maximum effectiveness. Remote-sensing technique allows cities to well understand emissions from their fleet and identify the largest culprits that can vary for each studied city (eg special taxis fleets, fleet age, share of diesel/petrol engines, etc)".

Bernard continues to explain the findings of the recent Paris report, published on 10 September 2019, by stating "the EDAR system allowed the city of Paris to perform measurements efficiently on a continuous 24-hour period. The collected data permitted ICCT and City of Paris to identify a worrying pattern in NOx emissions from Euro 6 diesel cars showing an average increase of 30 percent when temperature rises above 30 degrees Celsius. That kind of evidence can be very helpful for cities to forecast their next air pollution warning during hot days and decide which vehicles they should restrict access to the city."

Furthermore, Christophe Najdovski, the city of Paris' deputy mayor stated, "the use of remote-sensing devices to measure urban emissions from vehicles is an easy and efficient way to get a clear picture on real emissions. During the few weeks where the EDAR system was installed in Paris, we collected more than 180,000 data [records] that provided important insights about diesel car emissions and, for the first time, two wheelers. It allows us to go further in interpreting the trends of the air quality we breathe."

While Euro standards are based on the vehicles' performance in laboratory tests, EDAR is capable of directly analysing the whole exhaust plume of a vehicle while it is on the road, differentiating between polluting and clean vehicles immediately allowing cities to target policies far more accurately and effectively.

The technology exists that will aid cities around the world in meeting their air quality goals quicker, easier, and more effectively. By implementing the use of a cost effective, remote sensing system like EDAR to continuously monitor, cities will be able to achieve instantaneous, and positive results in real time.

### EDAR is Capable of:

- 24 hour unmanned monitoring
- Real world detection of gases such as: CO, $CO_2$, NO, $NO_2$, ($NO_x$), HC, PM
- Detecting the temperature of the exhaust
- Detection on multi-lane roadways
- Detection on high speed motorways
- High number of valid records in a short time period
- Operation in all weather conditions except heavy rain or snow
- Detection of any vehicle type with a single unit
- Detection of the shape and size of the vehicle
- Detection from above and goes virtually unnoticed by motorists

**FYI**

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# H3B Connected

www.h3bconnected.com

Cycle highways can boost cycle use on longer distances, says **Rico Andriesse**. This article highlights some important lessons from the Netherlands, namely planning and design

# I want one of those

Urban cycling is undergoing a real revival. Cycling facilities therefore need to be updated with investment in public space in (inner) cities. Cycling has become part of a hip, urban lifestyle. That's logical and coherent, and it's developing rapidly. In the past few years, a new element has been added: cycle highways on a regional scale.

Even in the Netherlands the great majority of journeys of between 7.5 and 15km are made by passenger car. Transport only has a serious share in the cities; traditional bicycles account for a range of up to 7.5km. e-bikes, in all kinds of versions, are a serious new player in the field [KIM, 2015].

If we want to benefit from this opportunity, the cycling infrastructure needs to be redesigned so that it can cope with more bikes and more speed differences. That's why the Netherlands has started to develop cycle highways.

Large-scale development of these has been ongoing in the country for almost 10 years now. It varies from creating wide, non-stop cycle highways to upgrading existing cycle paths.

**AGENDA:**

**Make sure there's a shared vision**

Cycle highways are coming in for a lot of attention. Let's take a look at what's

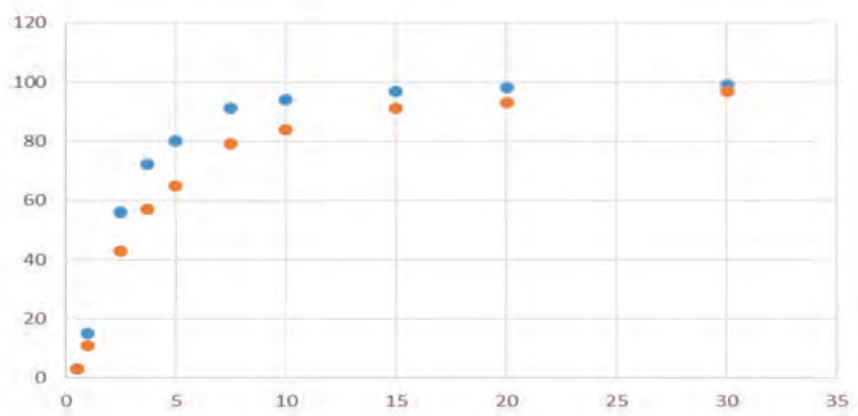

High quality bicycle bridge in Antwerp

***It's not a question of whether money should be used to deal with urban cycling bottlenecks or for fast regional routes, but whether money is available for regional routes or there's no money for cycling at all***

involved. Why all this interest in cycle highways? We've identified a number of reasons:

- Incorporating and constructing cycling facilities within cities is problematic, but creating routes between cities is often relatively easy;
- The advent of the e-bike makes cycling over longer distances more attractive (in any case also from a policy perspective);
- Cycle highways are entering a market with a lot of car bottlenecks, and therefore with a lot of policy attention and budget;
- Cycle highways often fall under the authority of regional or provincial governments, which can use them to raise their profile as regards cycling. In some cases (Flanders, for example), they are in fact one of the few policy areas where the region really has control. In the Netherlands, it's striking that it's mainly the regions and less the provinces that were the first to introduce cycle highways.

But does it therefore make sense to invest specifically in regional routes, or should cities still be given priority? However, that's not really the point at all! It's not a question of whether money should be used to deal with urban cycling bottlenecks or for fast regional routes but whether money is available for regional routes or there's no money for cycling at all (but there is money for car or public transport projects). Investing in cycle highways then quickly becomes a wise choice.



**Trip length of bicycles (blue) and E-bikes (red) in the Netherlands (kilometres, cumulatively) based on KIM 2015**

## AMBITION:

**Think big, set the bar high, and don't let that ambition fade away**

Creating a cycle highway always begins with an ambitious plan and with someone who aims to get it implemented. That may be the relevant executive councillor or an enthusiastic official within a municipality or region. At higher scale level too, national attention for cycle highways started with just one or two people with a vision and the ambition to make it a reality. That ambition also involves having a programme of requirements for the route and working to create the best possible cycling link via a fast and attractive route. You can always make compromises later.

## ANALYSE:

**What effects will there be?**

Arguments for investing in (fast) cycling facilities can vary depending on who you're talking to, but what they all say is that it's socially useful to invest in

cycling. We know that investing in cycling is relatively inexpensive, certainly when compared to large-scale car and public transport projects.

Every cyclist who cycles further or more often benefits society financially because of the environmental benefits that this generates, and above all the health benefits. That's definitely the case if the cyclist concerned used to drive (and so now reduces travel time for other motorists) or used to take public transport (and so now requires less funding for his journey). Cyclists are thus benefactors for themselves, for the world in general, and for the remaining car and public transport users.

## ANTICIPATE:

**Take advantage of the opportunities and developments that occur**

What is striking about the successful cycle highways that have been created so far or are being planned is the pragmatic approach to planning, prioritisation, and even routing. Where an opportunity arises for upgrading a promising route into a cycle highway, those concerned often simply go ahead and take that opportunity. For example, the recreation value of the historic dam structure at Nieuwegein has been a reason to construct a bridge over the Amsterdam-Rhine Canal at that point. Construction of a combined water retention area and nature reserve along the F35 offers opportunities as regards the spatial quality of this cycle route, but postponement of a planned new neighbourhood along the northern branch to Vriezenveen can just as easily give rise to different prioritising for that section.

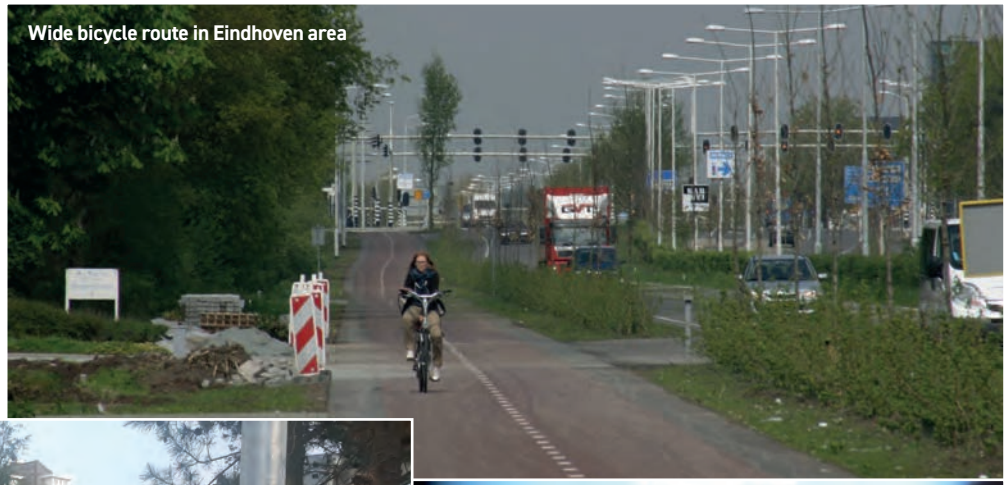
***Arguments for investing in cycling facilities can vary depending on who you're talking to, but what they all say is that it's socially useful to invest in cycling***

## COMPOSE:

**Select a number of suitable routes. Make sure they're attractive!**

The ideal cycle highway starts at your own front door and ends at your workplace and of course it also goes past your kids' school and your favourite supermarket! For the authorities as providers of cycle routes, it only becomes worth upgrading the route if enough cyclists will actually make use of it, in other words if they can get enough of them onto the route. The next step is then to select a logical beginning and end for the route. It needs to be a route that cyclists find easy to remember and that doesn't make them feel that it's not yet finished ("the cycle highway to Nijmegen University" is easier to remember than the "the cycle highway that starts somewhere between Zoetermeer and Pijnacker").

So, the route needs to go from one

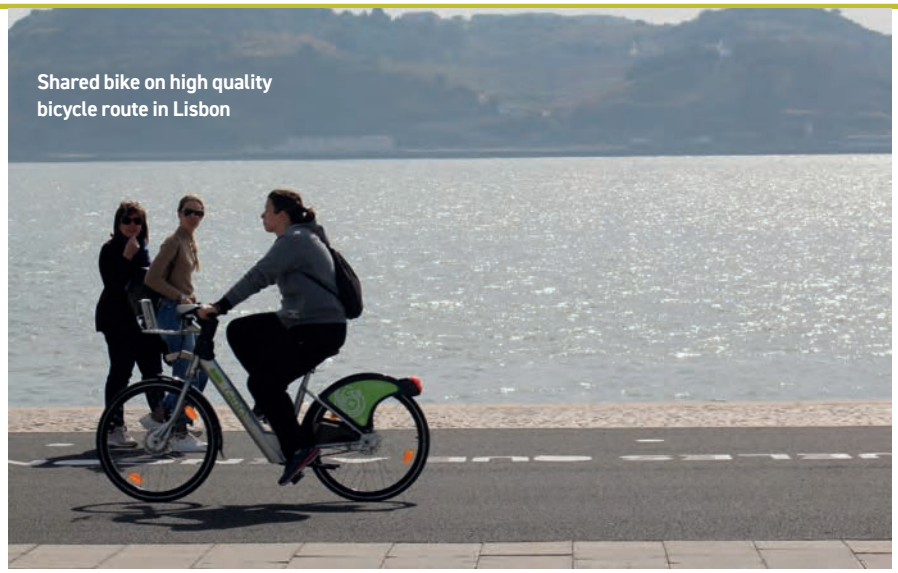

Wide bicycle route in Eindhoven area


New cycle route in Eindhoven


Bicycle bridge in Deventer

recognisable point to another, often from one big town to another or to an important feeder point. But that's not to say that everybody will ride the whole distance. No, most people will use only a section of the route. On the cycle highway between Leiden and The Hague, the biggest growth was on the sections close to the two cities, not on the long section in between them. [Fietsfilevrij, 2010] "Overlapping travel", just like in public transport.

Cycle highways form the backbone of the regional cycle network, so ensure a good connection from the urban and regional network onto the cycle highway. It's a missed opportunity if parallel, slower cycling routes are required because the link with the surrounding area is missing. Unlike motorways, you can fit cycle highways into built-up areas effectively without compromising the quality of life for residents or road safety. It's only the very narrowest streets that aren't suitable for a cycle highway. All the other streets, from neighbourhood level, are generally very suitable. But then you shouldn't refer to them as a fast route for cyclists and certainly not as a cycle highway, because that will cause a lot of trouble. At lower car volumes and speeds they should be referred to as a cycling street; on local access roads as a parallel cycle path; and in the park or other green areas as a solitary route.



Shared bike on high quality bicycle route in Lisbon

**COMMUNICATE:**

**Plan in collaboration with everyone involved**

A great deal is possible if there's effective cooperation with partners, stakeholders, and residents. Where are the really awkward problems and how can you solve them?

**CREATE:**

**Make it great! – something faster and more attractive, with and for local people**

If it's a good one, then a cycle highway is not just a route that allows fast cycling. If everything is coherent, then the route as a whole will be recognisable for cyclists and for others. An attractive spatial design will ensure that the route is attractive for cycling and fits in well with its surroundings. It creates a connection between various sets of surroundings.

**CAMPAIGN:**

**Gently persuade potential users**

Behaviour-forming measures can support and complement infrastructure measures. Creating a new cycle path or upgrading the existing structure invites people to cycle more. To ensure that more potential users of a route actually do cycle and keep cycling, it's advisable not just to utilise infrastructure and communication but also to influence people's behaviour.

> ***A great deal is possible if there's effective cooperation with partners, stakeholders, and residents. Where are the really awkward problems and how can you solve them?***

**FYI**

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An extended version of this article in Dutch can be found on https://www.goudappel.nl/actueel/fietsfeuilleton/

Cycle route connecting different environments

# Working the angles

Mobility behaviour change at large business parks begins with changing user behaviour and engaging businesses, according to **Alexandra Kershaw.** Facilitating modal shift through both bottom-up and top-down engagement is key


The drive to shift employee travel behaviour to more sustainable modes has been a salient issue in recent years, to meet end-goals such as sustainability targets, reducing negative environmental externalities, or facilitating other benefits such as enabling previously 'locked' land (eg, car parking) to be repurposed.

By shifting towards a more sustainable modal share at a large business park, multiple benefits for employers and employees on the park can be realised such as improved recruitment and retention of staff and repurposing of car parking space to other amenities. It also offers positive externalities for the surrounding area, such as reduced traffic congestion and emissions: an important contributor to the growing Net Zero Carbon movement.

One example where great success has been realised in terms of reducing single-occupancy car journeys is at Milton Park, a 300 acre, high-tech business and science hub located in Oxfordshire, UK. There are 9,100 workers based at the site, which is managed by MEPC.

> ***In order to engage best with the employees on the site, it was understood that not everyone would be motivated to change behaviour by the same offering***

It was decided that in order to help the sustainable growth of the park it was necessary to consider how to best move *people* rather than how to move *cars*. There was the opportunity to use the park as a test site for delivering good practices in advancing shared mobility and active travel, and to realise health, economic, social and environmental benefits.

In order to identify and deliver an integrated programme of sustainable mobility initiatives, Veronica Reynolds from Vectos was appointed as a Behavioural Change Advisor to be on-site, full-time, to take this agenda forward. Her main objective was to engage with businesses and employees and achieve behaviour change away from single occupancy vehicle use.

## Milton Park case study:

### MONITORING

Data and ongoing monitoring of progress against set targets is crucial to understanding the complex patterns of travel behaviour at Milton Park and to identifying which measures are likely to have the greatest impact on travel choices. To this end, comprehensive Travel Surveys have been completed in 2016, 2017 and 2018 with a record response rate of 22 percent that led to the creation and ongoing development of a Travel Plan and targeted Travel Campaign and a range of initiatives to encourage sustainable travel.

In addition, Milton Park invested in a state-of-the-art traffic sensor project operated by VivacityLabs to capture real-time data on all traffic movements in and out of the Park. The system enabled the measuring of the impacts of initiatives and provided data to the local authorities to help inform decisions about investment in cycling and road infrastructure.

**Vivacity captures real-time data on all traffic movements in and out of Milton Park**

### ENGAGEMENT

**With Employees...**

In order to engage best with the employees on the site, it was understood that not everyone would be motivated to change behaviour by the same offering. Therefore a range of strategies were implemented that brought a focus towards different aspects of sustainable mobility.

The Milton Park website travel pages were updated and upgraded to prioritise sustainable modes over driving and to reflect the messaging of the Milton Park sustainable travel campaign 'Enjoy your Commute'. Marketing and promotional materials, including posters, leaflets and loop presentations (company lobbies and public areas, for example) have been produced and updated regularly to highlight current initiatives. Signposting and signage across the Park is being upgraded and now includes motivational messages extolling the benefits of active travel for air quality and physical activity.

In addition, a number of initiatives to incentivise active travel have taken place, including a monthly 'Bike to Work' day with free breakfast and a 'Bike Doctor', carrying out free maintenance checks on site. In addition, Milton Park has organised an annual 'car free day' challenge with prizes for the companies with the highest proportion of participants, including a £500 (€580) donation to the charity of their choice and prizes for the 'quirkiest' non-motorised form of transport.

To ensure employees voices are heard, a bus and bicycle users' group was also established and they are regularly consulted about proposed interventions and changes to services.

> ***Key relationships have also been established with bus and train companies with a view to agreeing discounted fares for Milton Park employees and improving services***

**With Businesses...**

One key element that contributed to the success at Milton Park was the formation of a Travel Forum, in which 53 of Milton Park's companies were represented at quarterly meetings. In these meetings, HR staff and Directors met with the Behaviour Change Advisor to discuss key messages for the park. The group acted collectively to represent Milton Park businesses' interests when it came to local transport infrastructure and jointly commented on transport and infrastructure decisions that would have had an impact on their business, eg local road closures or deficiencies in local infrastructure such as lack of safe cycle routes. Meaningful partnerships have also been established with Oxfordshire County and District Council to prioritise work on the cycle routes around Milton Park, with four important routes now being upgraded.

The Behaviour Change Advisor continues to work closely with new businesses before they move to the Park, in order to influence new occupiers before they decide to default to single occupancy car use. By engaging prior to a move to the site, the key values of the new occupier can be understood, such as a focus on productivity and recruitment, and the new employers can portray specific messages to potential employees, such as health benefits and mobility options that work as draw to potential employees and that increase employee retention.

**With PT companies...**

Key relationships have also been established with bus and train companies with a view to agreeing discounted fares for Milton Park employees and improving services.

### IMPLEMENTATIONS TO ENCOURAGE BEHAVIOUR CHANGE

**Car Sharing**

A new state-of-the-art ride-sharing platform has been launched. FAXI provides users with an easy-to-use app to link

## Milton Park case study:

them with fellow commuters to share their car journeys, linked through a digital wallet. FAXI detects which vehicles are genuinely shared journeys, triggering incentives, rewards and preferential access to car parking. There are 45 carpool parking spaces within the park, with many more planned thanks to its growing in popularity. Today, 13% of employees now regularly share their journeys. The monetary savings can be as much as £1000 per year for the average journey to Milton Park.

### Milton Park Bike Loan Scheme

To encourage the take-up of active travel, a bike loan scheme, operated by the Oxford-based Bainton Bikes using Donkey Republic software to unlock and rent the bikes, has been set up and is proving extremely popular with over 150 rentals each month. The bikes are provided free to Milton Park occupiers and can be picked up or dropped off at a number of 'hubs' around the Park and at Didcot Parkway station, forming crucial "last-mile" connectivity.



Ride-Sharing promotion at Milton Park

### Milton Park Shuttle Bus

The Milton Park shuttle bus service between the Park and Didcot Parkway has been expanded to include a third hybrid double decker bus. WiFi has been added to all the buses to attract commuters wishing to work on board. The shuttle bus operates between the station and the Park and is available for use by Park occupiers for £20 per year in order to incentivise commuters to use combined rail and bus, rather than to drive. The service has recently been opened up for use by local residents (also for £20 per year) and around 55 people have taken up this opportunity. The bus has proved popular with school children from Sutton Courtenay who would otherwise have to pay a considerable amount for the local bus service or walk the 2.7 miles to school. The shuttle buses save on average 900 car journeys per day.

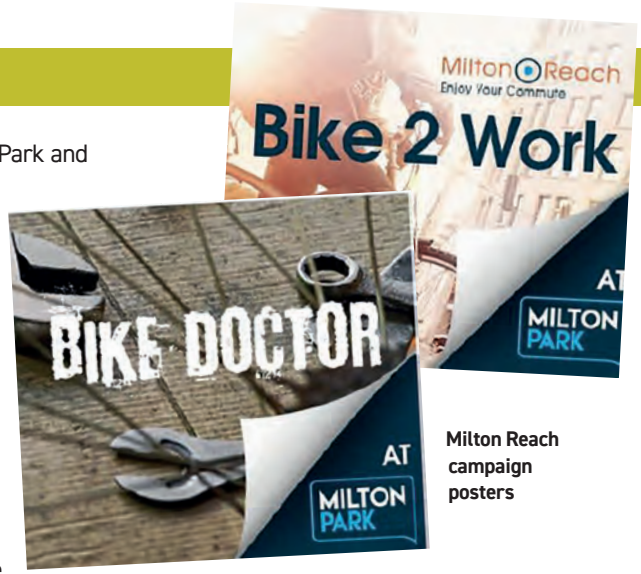
### Infrastructure

In addition to providing employees with realistic alternatives to private car travel to and from the park, the infrastructure on the park has also undergone a review.

An audit of cycling facilities at Milton Park was carried out and priority areas for investment were identified, such as additional cycle storage and changing facilities. An additional 80 covered cycle storage spaces have been created and plans for new cycle hubs are being drawn up. A new cycle link created through the Backhill Tunnel has already had a significant impact on cycling levels in the area.

Parking issues have also been significantly alleviated and a new parking protocol (designed to reduce congestion) has been introduced which has proved successful and acceptable to occupiers at Milton Park.

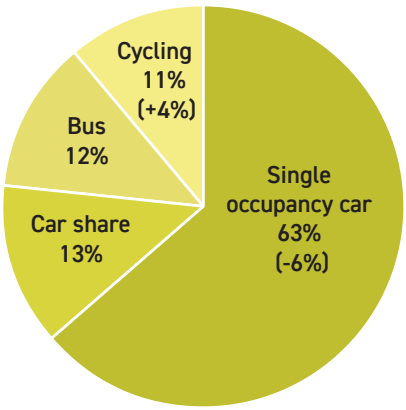
There are also 35 Electric Vehicle charging points on site.




Milton Reach campaign posters

### IMPACTS

**The mode share split as a result of these measures:**



## Milton Park case study:

The results of the Travel Surveys in October 2017 and 2018 show the extent of modal shift away from single occupancy vehicle use (SOV), from 69 percent SOV in 2016 to 63 percent in 2018 (6 percent reduction) and an accompanying rise in cycling from 7 percent to 11 percent. In addition, there are clear signs of a shift in attitude towards travel, the consequence of which is that Milton Park is becoming even more inclusive than it was before. Results to date show that more people are now aware of the choices in travel and there is a small, but growing, lesser reliance on single occupancy car use. Continued shift is expected in the next survey as the impacts of new infrastructure filter through.

The Behaviour Change Advisor fulfilled an important role in dealing with complaints from occupiers about travel matters from congestion, to parking, to bus complaints. This led to a very high level of engagement with occupiers and useful conversations which have helped to create a more positive narrative around development of the site. Veronica Reynolds was awarded the prestigious national award of 'Smarter Travel Professional of the Year 2018' and last year received the 'Responsible Property Investors' Sustainability Award for the work at Milton Park.

Due to the success of the behaviour change initiatives within Milton Park, the park is now looking to the future to maintain these shifts and also to become a test-bed for new and exciting technologies to encourage more people to shift away from their private car.

### GOVERNMENT GREEN-LIGHTS FIRST USE OF AUTONOMOUS VEHICLES ON UK ROADS

In February 2018, Innovate UK announced the award of £2.5 million to trial self-driving vehicles in and around Milton Park, where they will travel between private roads at Milton Park and the public roads that link the site with nearby transport services.

The 30-month MultiCAV project will be undertaken by a consortium of organisations with different sector backgrounds who are investing in the development of autonomous vehicles, and led by UK transport operator FirstGroup. Despite being relatively close to Didcot Parkway station, most travel to and from Milton Park is currently made in private vehicles, and with the site set to expand in the coming years, the MultiCAV consortium is building on the work already underway to provide the park with long-term, safe, sustainable transport. Commuters to the site will be able to connect with the 12-15 person self-driving pods from local transport services, while booking and paying for their trip in one easy process through a data aggregator, which is also being developed as part of the MultiCAV project. It is hoped that by the end of the trial up to 50 percent of private vehicle journeys within the business park will switch to using the shared, electric-powered pods.

### CONCLUSIONS AND WIDER INSIGHTS

The successes in changing mobility behaviour of Milton Park employees demonstrates the positive impact of engaging from both the bottom up (employees) and the top-down (employers/occupiers). A key success factor was the permanent and very visible on-site Advisor whose "Behaviour Change" title gave businesses and staff an unambiguous steer in the expected direction. It also opened doors with local authority and ministry level meetings and funding. The result of this is that the full impact of measures to reduce single-occupancy vehicle use can be realised, as the messages given to employees are constant and work together. For example, the impact of a strong campaign to reduce private car mode share at a site will never reach its full potential if the employers continue to promote ample parking on site.

By incorporating new technology and mobility services into the general mobility offer, it enables a shift away from private car use. Real-time information all in one place can encourage individuals to try a new route or a new mode, and even change attitudes towards the convenience of alternatives.

Building on the success at Milton Park, Vectos is continuing to work to integrate sustainable mobility measures at other business and large residential sites, both existing and those in the planning process. It is by integrating sustainable and innovative mobility into the design of new developments that we can also help contribute to net zero carbon agenda, by influencing behaviour from the very start.

***In February 2018, Innovate UK announced the award of £2.5 million to trial self-driving vehicles in and around Milton Park***

**FYI**

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# Traffic Efficiency & Mobility

**The section on Mobility, Multimodality and Traffic Efficiency addresses issues related to network management, network efficiency and innovative services, with a particular focus on Intelligent Transport Systems**

- **The Hague – Automated vehicles meet parking choice**
- **Sustainable Transport – Young people deserve the right to be mobile**
- **Île de France – Electric bikes and a new way of thinking**



# Personal space

## The effects of private automated vehicles on drivers' parking location choice


**Daphne van den Hurk** posits the theory that the introduction of automated vehicles will improve the quality of the public space by matching parking demand and supply with the use of pricing policy

Automated vehicles have been receiving increased attention all over the world, as the first fully automated vehicles are now operating on the public road network. Automated vehicles could not only have a tremendous impact on the urban environment but also on human

travel behaviour. With the capability of automated vehicles to ride and park themselves instead of being operated by a human driver, it is likely that parking choice behaviour will change when conventional vehicles are replaced by automated vehicles. In order to make investment decisions, it is important for governments to gain insight into the impacts of automated vehicles.

## PRIVATE AUTOMATED VEHICLES

Automated vehicles can either be privately used or shared with others. Although car sharing is emerging, it has been demonstrated that sharing a vehicle with strangers is an attitudinal problem that is hard to overcome. The study of Correia *et al* (2013)[1] concluded that it is difficult to change from an acquaintance-based carpooling (household or employer) to a system where strangers share their rides. Therefore, it is interesting to focus on the effects of private automated vehicle scenarios.

## A TRIP WITH A PRIVATE AUTOMATED VEHICLE

A schematic overview of a trip with a private automated vehicle is visualised in Figure 1. The trip with an automated vehicle starts from the 'passenger origin' and develops in the direction of the 'passenger destination'. Space to drop-off the passenger is needed to avoid congestion caused by dropping-off passengers on the road itself. On-street parking space is used for the drop-off manoeuvre. When the passenger is dropped-off at a drop-off point, the passenger walks to the destination. Simultaneous to this walking leg, the automated vehicle drives empty from the drop-off point to a parking facility. The two considered parking locations are: parking in the inner city and parking at the edge of the city, both at off-street facilities. When the passenger's activity has ended, he/she walks to a pick-up point. On-street parking space is used for the pick-up manoeuvre. Simultaneously, the automated vehicle drives empty from the parking facility

***With the capability of automated vehicles to ride and park themselves instead of being operated by a human driver, it is likely that parking choice behaviour will change***

**Interior of a private automated vehicle**

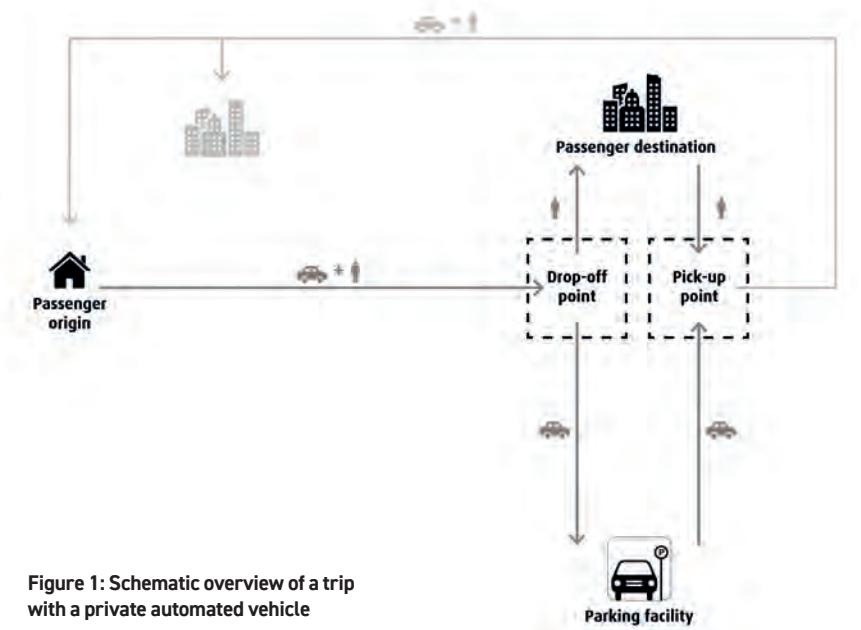


**Figure 1: Schematic overview of a trip with a private automated vehicle**

## NOTES

1 Correia, G. H., de Abreu e Silva, J., & Viegas, J. M. (2013). *Using latent attitudinal variables estimated through a structural equations model for understanding carpooling propensity.* Transportation Planning and Technology, 36(6):499-519.

***A stated preference experiment is conducted to test which parking facility respondents prefer: a parking garage in the inner city or a parking lot at the edge of the city***

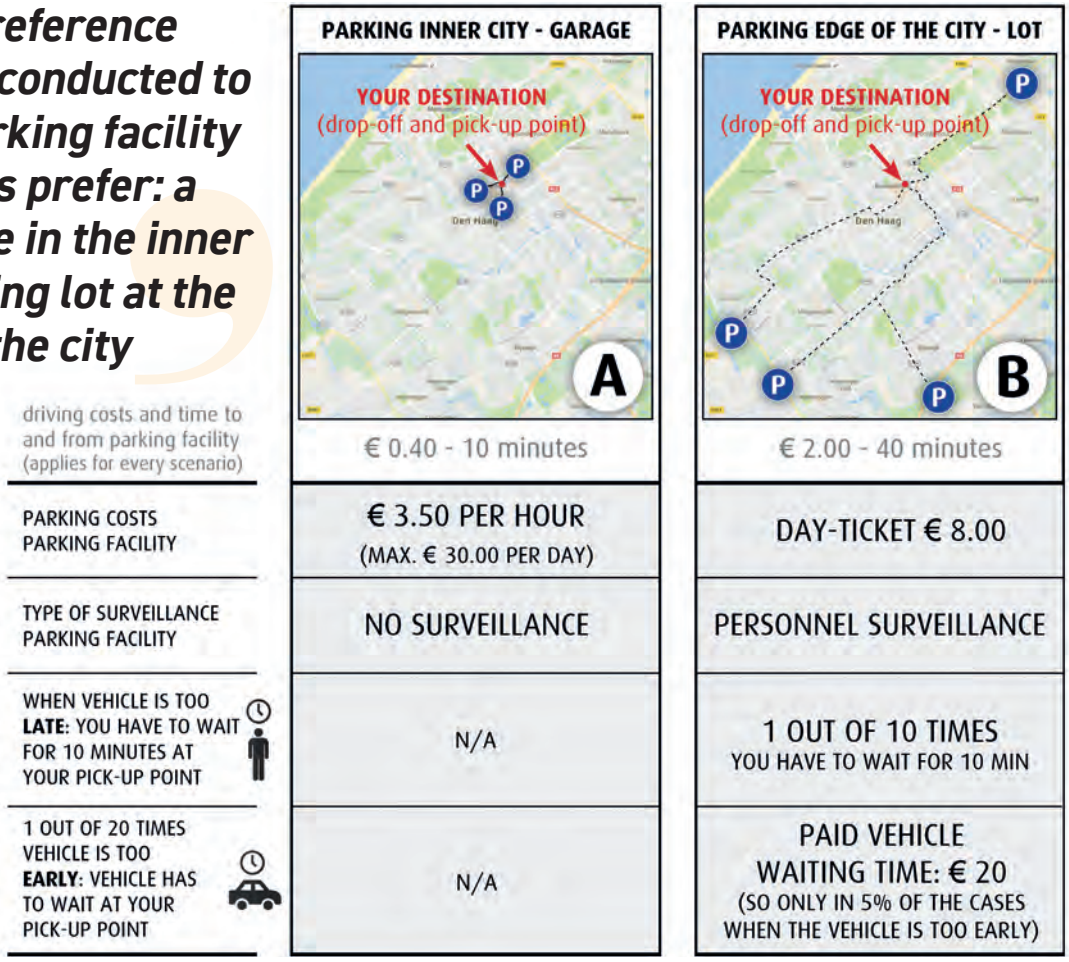


**Figure 2: Example of a hypothetical choice situation**

to the pick-up point. When the passenger and the automated vehicle have both arrived at the pick-up point, the vehicle trip from the pick-up point to the passenger's home or to another destination starts.

## 400 RESPONDENTS

An extensive literature review and some brainstorming sessions were conducted in order to list all the factors that could influence drivers' parking location choice. A stated preference experiment is conducted to test which parking facility respondents prefer: a parking garage in the inner city or a parking lot at the edge of the city. Data of approximately 400 respondents from the province of South-Holland was used in the data analyses. As a result of choices made by respondents in the hypothetical choice situations, insight was gained in individuals' preferences and trade-offs. In Figure 2, an example of the hypothetical choice situation is shown.

## PREFERENCE FOR CHEAP PARKING AT THE EDGE OF THE CITY

In terms of current parking circumstances, 28 percent of the individuals would choose the parking garage in the inner city. Hence, 72 percent of the individuals would choose the parking lot at the edge of the city. From the results of the scenario analysis it can be concluded that individuals are mostly driven by a change in direct costs, i.e. the 'parking cost' at the parking facility and the 'parking fee' for temporary parking the automated vehicle at an on-street parking place near the passenger's destination.

When the parking cost in the inner city is decreased by €1 per hour, parking demand will increase by 11 percent. Furthermore, it could be expected that when the parking cost in the inner city increases by €1 per hour, parking demand will decrease by 8 percent. When there are no parking costs at the edge of the city, parking demand will remain the same. When the parking cost at the edge of the city increases from €4 per day to €8 per day or even €12 per day, it is expected that parking demand will drastically decrease by 15 percent and 45 percent respectively. When a parking fee of €20 is implemented for temporary parking automated vehicles at an on-street parking place near the passenger's destination, parking demand at the edge of the city will decrease by 19 percent. This has the same effect as increasing the parking cost at the edge of the city from €4 to approximately €8.50 per day.

From the results of the scenario analysis it can be concluded that individuals are less sensitive about 'personal surveillance' and 'risk of extra waiting time'. In fact, the presence of personal surveillance has a positive influence on drivers' parking location choice. When personal surveillance is available at a parking facility, demand will increase by 6 percent in the inner city, compared to 3 percent at the edge. From the results of the model, it was concluded that camera surveillance is not significant, which means that camera surveillance is valued as much as no surveillance. This means also that when the parking facility is monitored by cameras, it is expected that this will not lead to an increase or decrease in parking demand. The risk of extra waiting time (for 10 minutes) during the off-peak period is one out of 10 times. When there are no separated lanes for automated vehicle, the risk of extra waiting time during the peak period is likely to be higher. When the risk of extra waiting time is increased to three out of 10 times or five out of 10 times during the peak period, and no separated lanes for automated vehicles are available, the parking demand at the edge of the city will decrease to 5 percent and 9 percent respectively.

Trip characteristics, perceptions on the risk of damage during the empty vehicle's journey and personal characteristics do not have much effect on the attributes that influence drivers' parking location choice

## DIRECTIONS FOR PARKING POLICIES

Directions for parking policies are related to different topics regarding parking regime, price and capacity.

First, in order to reduce the number of on-street parking spaces, it is advised to forbid the parking of automated vehicles at on-street parking spaces. Consequently, released space could be used for drop-off and pick-up. It is not expected that all on-street parking space will be needed for drop-off and pick-up. Similar to the current situation, it might be considered that inhabitants of the city of The Hague are allowed to park their automated vehicle on the street with a parking permit. Furthermore, released on-street parking spaces could be used for greenery or extra space for bicyclists and pedestrians.

Second, in order to minimize the number of empty vehicle kilometres, it is advised to stimulate short-term parking of automated vehicles in the inner city and stimulate long-term parking of automated vehicles at the edge of the city. This could be done by increasing the cost of parking at the edge of the city from €4 euros to €10 euros per day. Consequently, approximately 55 percent of the individuals would park their automated vehicle in the inner city, compared to 28 percent that parked their automated vehicle in the inner city in the base scenario.

Third, it is advised to implement a dynamic pricing strategy for the parking fee for temporary automated vehicle parking at an on street place near the passenger's destination, when the automated vehicle arrives too early. When implementing a dynamic pricing strategy, the municipality is able to: 1) control supply and demand, 2) account for competitor pricing and 3) account for external factors (e.g. peak periods). When a parking fee of €20 is implemented, approximately 47 percent of the individuals would park their automated vehicle in the inner city, compared to 28 percent that parked their automated in the inner city in the base scenario.

***To minimize the number of empty vehicle kilometres, it is advised to stimulate short-term parking of automated vehicles in the inner city and stimulate long-term parking of automated vehicles at the edge of the city***

**FYI**
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# Nothing but the youth

Transport availability has a huge impact on the life-choices young people make and access to transport is key to defining the options that young people have. **Dr Kiron Chatterjee**, **Dr Miriam Ricci**, **Dr Andy Cope** and **David Corner** explain why young people deserve the right to fairer mobility

We can all relate to the question of whether we can get to the places we want to go at the times we want to be there. These challenges play out even more emphatically for younger people, partly because their options may be fewer (eg, many do not have access to a car) and their destinations of choice are often more diverse. Also, these challenges are especially profound for young people from poorer parts of society.

For example, if a local college doesn't run the subject that a young person is interested in, is it possible for that individual to access a more distant college that does support their preferred subject? If a job offer is made, can an individual get to that place of work? Quite simply, there is no point having good jobs and services if young people cannot get to them.

In the UK, there is increasing recognition of the wide range of factors that influence long-term health outcomes for young people. These include families, education, employment, youth services, and local identity. But another major factor is transport. Transport is identified as a factor that can enable, or that can limit choices, by young people in urban and rural areas, from all sections of society, and with all categories of needs.

The Health Foundation, is an independent charity committed to bringing about better health and health care for people in the UK, and the second largest endowed foundation in the UK focusing on health. The Health Foundation is conducting a Young People's Future Health Inquiry. The Inquiry aims to

***In the UK, there is increasing recognition of the wide range of factors that influence long-term health outcomes for young people. These include families, education, employment, youth services, and local identity. Another major factor is transport***

build an understanding of the influences affecting the future health of young people (for the purposes of this exercise aged 16-24 years).

## THE IMPACTS OF INADEQUATE TRANSPORT

The University of the West of England in Bristol and Sustrans were commissioned by the Health Foundation to review young people's access to transport in the UK, to explore the ways that they use transport, and to assess the impacts this has on their lives.

The study found that young people have become increasingly reliant on getting lifts by car as journey distances have increased over time. However, when young people reach driving age they are less likely to get a driving licence than was the case before the turn of the millennium and they make fewer trips than before . As a consequence, buses are much more important for young people moving into adulthood (those 17-20 years of age) than for any other age group and this is particularly the case for those living in a household without a car.

The study reviewed research and identified eight ways in which transport can influence life course and health outcomes.

- Education and training options – Young people can have limited local education and training options due to lack of transport to get to more distant opportunities
- Participation in out-of-school activities – A household car enables children to participate to a greater extent in out-of-school activities; participation in out-of-school activities has been shown to benefit children economically in the long run
- Physical activity and mental wellbeing – Walking and cycling contribute significantly to recommended physical activity levels for young people who travel in these ways and physical activity is linked to better mental wellbeing
- Independence, autonomy and self-worth – Independent mobility allows young people to develop social connections and choose their own activities, providing increased autonomy in their lives
- Capabilities and willingness to use transport options – Young people supported and encouraged to use alternatives to the car as children are more likely to be willing to use them when older
- Employment opportunities – Young people are disinclined from considering jobs with difficult journeys by public transport and employers are reluctant to offer jobs to them
- Stress, fatigue and low self-esteem – Poor quality of the built environment for walking (unattractive, mistreated and 'forgotten' places) causes psychological and emotional stress
- High transport costs and job/housing immobility – Young people are less likely to change their job or move home to seek improved career opportunities than previously was the case with high transport (and housing) costs seen as contributory factors

Dr Andy Cope, Director of Insight at Sustrans said "In the interests of fairness and equality, it is essential that transport helps to maximise the opportunities that young people have. This is crucial to supporting positive health outcomes for more young people.

"The dividends of improved health outcomes, in terms of the reduced burden on health care services, could be considerable".

With this in mind, the report makes a series of recommendations that seek to overhaul transport to give young people the best possible start in life.

Jo Bibby, Director of Health at the Health Foundation said "In many places, we were told that the local transport on offer did not meet the needs of young people; that it was too expensive and not frequent enough.

"This is an issue because the places we go to learn and work in our younger years are vital to setting ourselves up for a healthy future and the potential risks posed by any barriers to accessing these should not be underestimated. Those who are unable to access education, work, services, or maintain relationships with friends, family and communities due to a lack of adequate transport infrastructure face serious implications for their independence and quality of life. A lack of transport options can also make relationships difficult and ultimately result in feelings of isolation, not to mention limiting access to vital local youth services".

Dr Kiron Chatterjee, Associate Professor in Travel Behaviour at the University of the West of England said "Transport directly affects the education, training and employment choices available to young people. It affects the opportunities young people have to participate in extra-curricular activities – which have been shown to be highly beneficial for future prospects. If young people are unable to travel independently this has been shown to restrict their social development and the autonomy they have over their lives.

"Relying on limited means of transport, such as getting lifts, has been found to inhibit young people's activities. Where young people are supported and encouraged to use alternatives to the car as children, they are more likely to be willing to use them when older. If they walk or cycle this has been shown to contribute significantly to achieving recommended physical activity levels as well as contributing to better mental health".

Walking and cycling have been shown to improve young people's mental health as well as their physical health

## RECOMMENDATIONS...

### Re-prioritising investment

**Recommendation 1** – Transport subsidies should be redirected as a force for positive change for young people.

Subsidies and policies that stimulate car use carry negative effects on public health and tend to impact disproportionately on those living in more deprived areas.

A transformative transport system would reward positive travel choices, rather than locking-in behaviours with a greater negative cost to society, and thereby benefit younger people.

**Recommendation 2** – Government needs to support systems for concessionary fares, bursaries and loans that are clear, universal and consistently applied.

Concessionary fares systems need to be non-discretionary and funded across the UK to benefit those younger people who are most in need of reduced travel costs.

Concessionary fares should cover all those subject to compulsory study or training (16 and 17-year-olds) and all those people under 25 looking for work and in the first months of employment.

**Recommendation 3** – Government should invest a greater proportion of the overall transport budget in walking and cycling and encourage younger people to travel actively.

Transport investment should align with the move towards preventive healthcare.

Too few young people are walking or cycling, partly due to poor physical environments to do so and partly due to not developing skills and capabilities.

The planning system should prioritise the creation and retention of jobs for younger people in locations that can be served by walking, cycling or public transport.

Schools and other educational institutions should have appropriate infrastructure to provide for them to be reached by walking and cycling, and infrastructure for cycling and walking should address the needs of younger people in terms of destinations, amenity and convenience.

> ***Infrastructure for cycling and walking should address the needs of younger people in terms of destinations, amenity and convenience***

### LINE OF BEST FIT

One of the key recommendations is for governments to invest more heavily in walking and cycling. This suggestion would help transport to better align with preventive care priorities, and has recently been endorsed by major stakeholders in health in the UK, perhaps most notably the Chief Medical Officers and the British Medical Association.

Schools and other educational institutions should have appropriate infrastructure to provide for them to be reached by walking and cycling, and infrastructure for cycling and walking should address the needs of younger people in terms of destinations, amenity and convenience. The planning system should prioritise the creation and retention of jobs for younger people in locations that can be served by walking, cycling or public transport.

It is clear that the transport issues facing young people vary across the country and this must be responded to by policymakers both at a national and regional level. We are seeing some positive movement locally with the recently launched Our Pass initiative in Manchester, which allows 16 to 18-year-olds to travel for free on local buses right across Greater Manchester.

Additionally, the Apprenticeship Travelcard launched by the Mayor of Liverpool, Joe Anderson, is giving young apprentices half price train travel. One thing that both of these schemes have in common is their emphasis on the connection between transport, education and the world of work.

Having joined up policies which enable young people to access the key building blocks for a healthy future, including secure work and the right skills, is vital for securing our nation's greatest asset, the future health of our society.

For many young people, transport can steer decision making that is crucial to the course that their lives take. These sorts of decisions can profoundly affect health outcomes in later life.

### Enhancing decision-making

**Recommendation 4** – Transport planning decisions should acknowledge the impacts of transport on young people and reflect the need to reduce inequality in transport access in the investment decision-making process.

Decisions on transport planning do not sufficiently acknowledge the wider societal and wellbeing impacts of transport for young people.

Investment decisions should be guided by whether they reduce inequality in transport access, including for young people.

**Recommendation 5** – Planning regulations should ensure that housing connects younger people to sustainable transport options.

A new development that is attractive to younger people should, wherever possible, be located within or adjacent to existing urban areas or commuter hubs.

Existing housing stock that is suited to younger people should be connected to transport infrastructure that supports mobility for younger people.

### Better understanding young people's needs

**Recommendation 6** – Transport regulators and providers should engage with local youth councils and other fora to ensure they are aware of the needs and views of younger people on local transport issues.

There needs to be a clearer voice for young people in planning and delivering transport services.

Stakeholders in local authorities with similar characteristics should share learning with each other about the approaches they are adopting to give young people a voice and address their needs.

**Recommendation 7** – Government needs to initiate in-depth research and analysis of young people's travel patterns, needs and attitudes, and of the role of transport access and choice in supporting young people to develop and transition to an independent, healthy future.

**FYI**

**Dr Kiron Chatterjee** is Associate Professor in Travel Behaviour, University of the West of England

**Dr Miriam Ricci** is Senior Research Fellow, University of the West of England

**Dr Andy Cope** is Director of Insight, Sustrans

**David Corner** is Quality Manager, Sustrans

**https://www.sustrans.org.uk/our-blog/research/all-themes/all/the-role-of-transport-in-supporting-a-healthy-future-for-young-people/**

# A long-term commitment

Île-de-France Mobilités has rounded off its cycling policy in the Île-de-France region with the launch of a new, long-term rental service, with 10,000 electric bikes for €40 a month for all residents in the region, as well as a grant for purchasers of new electric bikes. **Marion Chollet** and **Cyril Aillaud** take up the story


The Île-de-France Regional Bike Master Plan aims at tripling the bike modal shift while encouraging daily travelling by bike. For several years, Île-de-France Mobilités has been rolling out specific parking spaces for bikes within stations of the regional public transport network. In order to complete services offered by Île-de-France Mobilités, the Véligo Location scheme – a long-term electric bike rental service – was launched in September 2019. With the first 10,000 bikes made available, that new service is now the most important in the world.

## CONTEXT AND ORIGINS OF THE SERVICE

Île-de-France Mobilités, the organising authority for public transport in Île-de-France, is committed to taking up the challenge of organising mixed-modal transport by developing new forms of mobility, including car-pooling, car-sharing, cycling, transport on demand and autonomous vehicles, as a complement to existing public transport, and helping to make getting around the Paris area easier on a daily basis. The aim is to encourage the region's residents to leave their cars in the garage whenever possible.

Even though cycling only accounts for a small percentage of trips in Île-de-France (around 2 percent), bike-riding has a real potential for progress for short or medium-length trips. In the Île-de-France region in recent years, cycling has mainly developed in the capital.

Until now, Île-de-France Mobilités' cycling policy was based on deploying open and locked bike stations, providing mixed-mode solutions alongside the public transport network. Almost 7.000 places have been created throughout the region, and deployment continues.

Electric bikes provide real added value in cycling, a form of transport that is already widely recognised as ecological, economical and good for health. The average distances travelled by cyclists are much longer, rising from 2.5km with a regular bike to 9km with an electric bike. Bearing in mind that the average commute in the Île-de-France region is 10.3 km, using an electric bike is possible not only for the first or last mile of daily trips to the train station, but also for the entire commute without effort, irrespective of the cyclist's physical condition and the layout of the terrain.

Electric bikes are now an efficient and credible form of transport to replace cars and will bring about an increase in bike-riding in the region, and especially in the suburbs or the rural outskirts.

On the basis of these developments and the stakes involved, Île-de-France Mobilités has decided to launch a long-duration electric bike rental service: Véligo Location. To roll out Véligo Location, Île-de-France Mobilités has drawn up a public service delegation contract for a duration of six years. A contractual agreement has been signed with the Fluow consortium, made of La Poste, Transdev, Vélogik and Cyclez, for a total budget of between €62m and €111m, depending on the number of bikes made available.

***Electric bikes are now an efficient and credible form of transport to replace cars and will bring about an increase in bike-riding in the region, and especially in the suburbs or the rural outskirts***


## DESCRIPTION OF THE SERVICE

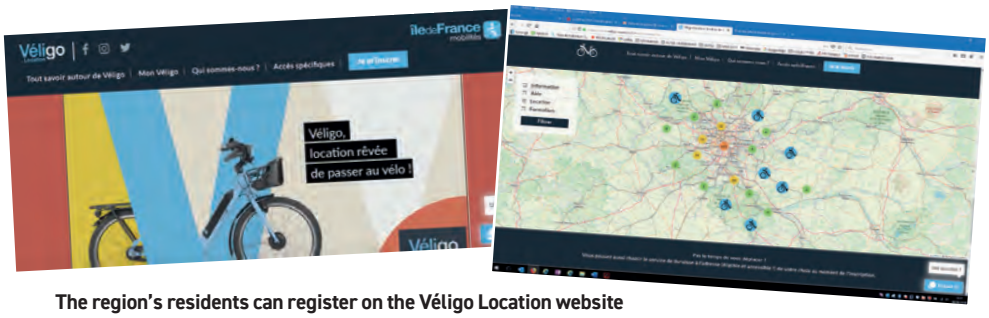
Since 11 September 2019, 10,000 electric bikes have been progressively made available for rent to all the region's residents. Depending on the success of the scheme, the number of rental bikes could rise to 20,000, which would make this the biggest long-duration electric bike rental service in the world. A range of cargo bikes (bikes with two or three wheels) could round off the offer by the end of 2020.

To sign up, the region's residents can register on the Véligo Location website (https://www.veligo-location.fr/) to rent a bike for six months (renewable once for three extra months). The goal for Île-de-France Mobilités is to give the region's inhabitants a chance to try out an electric bike, to convince them of the value of this form of transport for their daily trips and to boost changes to modes of transport. At the end of the contractual period, the aim is to reach almost 200,000 people in the region.

The price for the service is €40 a month (€1.30 a day). This price includes repairs and maintenance for the bike, with 50 percent of the monthly subscription payable by employers, alone or in addition to the Navigo public transport subscription for customers with mixed-mode commutes.

To guarantee a high level of service, additional features, including accessory rentals or insurance (theft and damage), are available to customers. Discount rates are also possible.

The Véligo Location scheme is available everywhere in Île-de-France. To pick up a bike, customers can choose between going to one of the 250 rental points or to have a bike delivered directly to the location of their choice, such as their home or workplace. There is a wide range of rental points: post offices and mail distribution centres in La Poste group, Urbis Park car parks, shops, independent bike stores or the premises of several associations.




**The region's residents can register on the Véligo Location website**

## THE BIKE

The bike has been designed and assembled in France. Special attention has been paid to the design, including a basket to protect riders' belongings, a luggage rack where a child seat or

saddle bags can be fitted, and a protected phone holder where riders can recharge their smartphones. The bike is robust and comfortable: the puncture-proof tyres are wide, and the technology with a torque sensor providing progressive assistance is innovative and makes for a pleasant riding experience. The battery has a travel range of 75km and is at frame level having been specifically designed for the Véligo Location bike, helping to limit theft.

## PROMOTING THE SERVICE

Since the service will be rolled out in an area of 12,000 km², a big marketing plan has been developed to promote the service and make it more widely known. Media campaigns in the public transport networks and along road networks have been set up.

Extensive press coverage has helped promote the service, too. Social networks are also powerful communication and information channels for the roll-out of the scheme. Twitter, Facebook, Instagram and LinkedIn accounts have been set up. The Véligo Location teams have visited each department in the Île-de-France region with an information kiosk containing up to seven bikes to publicise the service.

Local authorities, including municipalities, also have a big role to play in raising awareness about the service. Véligo Location provides them with three ways to take part in the project:

- Opening a rental point in their town or area to expand the network;
- Promoting the service among local residents. A dedicated communication kit is available online: with posters, flyers, banners and articles, everything is ready to be included in a range of media and the possibility for local authorities to include their logos in the material;
- Giving customers a chance to try out Véligo Location bikes directly in their area: the Véligo Location team regularly goes out and about in the Île-de-France region to introduce the service and let people try the bikes. The promotional campaign can include, for example, special events during local festivities and at markets.

***Véligo Location has also developed a series of special events for companies to introduce the service and including training in bike-riding in an urban environment***


Since companies may want to recommend cycling to their employees, Véligo Location has also developed a series of special events for companies to introduce the service and including training in bike-riding in an urban environment.

## EXPECTED ECONOMIC IMPACT

A positive, wide-ranging economic impact is expected from this future service. Indeed, 50 direct jobs have been created to help run the service. Eventually, over 500 indirect jobs are expected to be created, providing a real impetus for the cycling economy in the Île-de-France region. These jobs will be created in the sale of electric bikes and accessories, repairs and maintenance for purchased bikes, as well as for deploying high-quality bike-parking services.

## GRANTS FOR BIKE PURCHASERS

To encourage the region's residents to take up cycling, Île-de-France Mobilités will be rounding off the Véligo Location service with a grant for buyers of new electric bikes and cargo bikes. Customers can buy their own bike with a grant of 50 percent of the retail price with a limit of €500 per bike and per purchaser after the deduction of local subsidies. The scheme will start at the end of the first Véligo Location bike rentals, in late February 2020.

## CONCLUSION

Only one month after Véligo Location was launched, 20 percent of the bikes have already been rented, above the initial contractual objective; 76 percent of the subscribers live in the suburbs and 24 percent within the City of Paris; 45 percent of the users are women. Three quarters of the subscribers took out an insurance policy and 30 percent decided to hire accessories (cycling helmet, padlock, etc.). These figures are very promising.

**FYI**

**Marion Chollet** and **Cyril Aillaud** are Bike-sharing systems Project Officer and International Relations & European Affairs Project Officer at Île-de-France Mobilités

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# Access

This section focuses on mobility for urban economic development and social policy. This includes accessibility of transport for the mobility impaired and accessibility to basic services for everyone; the financing of public transport and transport projects generally; and regulation, planning and governance





Harry Schiffer

# The liveable train station

Crowd management at Utrecht Station

Photo: The City of Aarhus

The future of mobility as we know it is depicted with undeveloped flying objects and autonomous machines carrying suited people in a highly effective manner. We have got used to talking about the future of mobility in this way and keep talking about how smart our cities will be, without actually discussing how we would like our cities to be in the future. **Simon Wind** and **Gustav Friis** look to get the discussion going...

In late September 2019, the mobility department at the City of Aarhus travelled to the Dutch cities of Amsterdam, Utrecht and Arnhem to have a direct look into the future. All these cities have made impressive transformations of their main train station areas and we wanted to have a closer look at what had been achieved. Over three intensive days, the delegation of 20 mobility planners were guided through the three station areas by representatives from Benthem Crouwel Architects and the city administrations of Utrecht and Arnhem.

Being in the very initial phase of a re-designing process for the main train station area in Aarhus, this study tour not only gave good advice, inspiration but also raised questions on how a long-lasting process of redevelopment can be shaped. We are planning for an efficient future mobility system, but we are also planning the future city.

This article reflects the authors' views and learnings and what we intend to bring with us back to Aarhus and the planning process for the redevelopment of the main station area.

## DESIGNING FOR FLOW

When visiting the main train station areas in Amsterdam, Utrecht and Arnhem the first aspect that struck us was not only the scale and careful interweaving of transport modes, but also the sheer efficiency. Behind the station design, we learned, lies a clear strategy of managing large quantities of travellers that move through the urban centres every day. This is very evident in Amsterdam and Utrecht where the station areas are by the use of architecture, materials, lighting, wayfinding, nudging and crowd management designed as traffic machines par excellence.

To understand this, one must see the central role that the main station areas play in transitioning the major Dutch urban regions from being primarily car-based towards multi-modality. As one representative from the City of Utrecht stated, from the middle of the last century the focus was to facilitate the car – cities were planned and built around car infrastructure which only led to more car traffic and more infrastructure and less

***From the middle of the last century the focus was to facilitate the car – cities were planned and built around car infrastructure which only led to more car traffic and more infrastructure and less attractive cities***

attractive cities. In the late 1980s this focus shifted towards public transport and, in the Netherlands, to biking, in order to create calmer and liveable cities.

The four major cities in the Randstad area in the Netherlands, the pan-urban region encompassing Amsterdam, Utrecht, The Hague and Rotterdam, have taken a stand towards the car and urban sprawl in a radical manner. In this vision, liveable and attractive urban regions should not be dominated by car traffic and public transport: biking and walking together with transit-oriented development and densification should be (and indeed are) prioritised.

At Amsterdam Centraal, the metros, busses, trains, trams, pedestrians and bikes are stacked in layers. At Utrecht Centraal, traffic functions are neatly juxtaposed next to each other. In Arnhem, the traffic function area is clustered around a snail shell shaped terminal. The individual traffic functions are knitted together with strategically placed pedestrian and bike routes, hallways and corridors that also interweave the station areas together with the surrounding urban fabric.

Knowing the limitations and challenges in Aarhus, what we found particularly impressive was how it has been possible to reorganise and gather existing traffic function, as well as introducing new ones (i.e. light rail) in more logical and efficient setups at this scale and in the existing urban centres, which have a notorious lack of space. These steps require not only economic muscle but also political will and foresight. In Amsterdam it has taken 20 years to come to this point and the station area is still under development. It is the same picture in Utrecht and Arnhem. These large-scale projects are best understood as new urban districts that are not developed overnight but over decades.

Importantly, we learned that the development of all the major station areas is handled in consortiums of key stakeholders. In the case of Arnhem, the consortium consists of the city of Arnhem, Regio Arnhem-Nijmegen, NS, ProRail, and several private landowners and investors. Although such consortium constructions with varying individual and often conflicting interests are a challenge to manage in themselves, they are a necessity in successfully negotiating, creating support and accomplishing complex large-scale projects as we have seen.

Traffic flows at Amsterdam Station

*Photos: The City of Aarhus*

## DESIGNING FOR LIVABILITY?

The main station areas in Amsterdam, Utrecht and Arnhem are best comparable with airport terminals. They deal in capacity, reliability and safety first and foremost. Instrumental flow space is not particular pleasant to travel through or linger in, therefore in the design of the stations there is also a strong focus on endowing transit space with liveability and public space qualities.

What we learned was that in the design of all three station areas there are ambitions to be more than just generic traffic machines: Amsterdam, Utrecht and Arnhem's stations wish to become places that give something back to their respective cities, and in themselves are attractions with urban qualities and attractiveness. As Benthem Crouwel Architects, who have designed a majority of all the main train stations in the


Photo: The City of Aarhus

largest cities in the Netherlands, told us, their approach to create successful mobility hubs is to marry transit design with urban design. "At the heart of this approach there is an acute passenger perspective", we were further told by the architects.

Therefore, the stations we have visited are designed to be places of travel as well as places to meet, linger, eat, shop, hang out, interact and play.

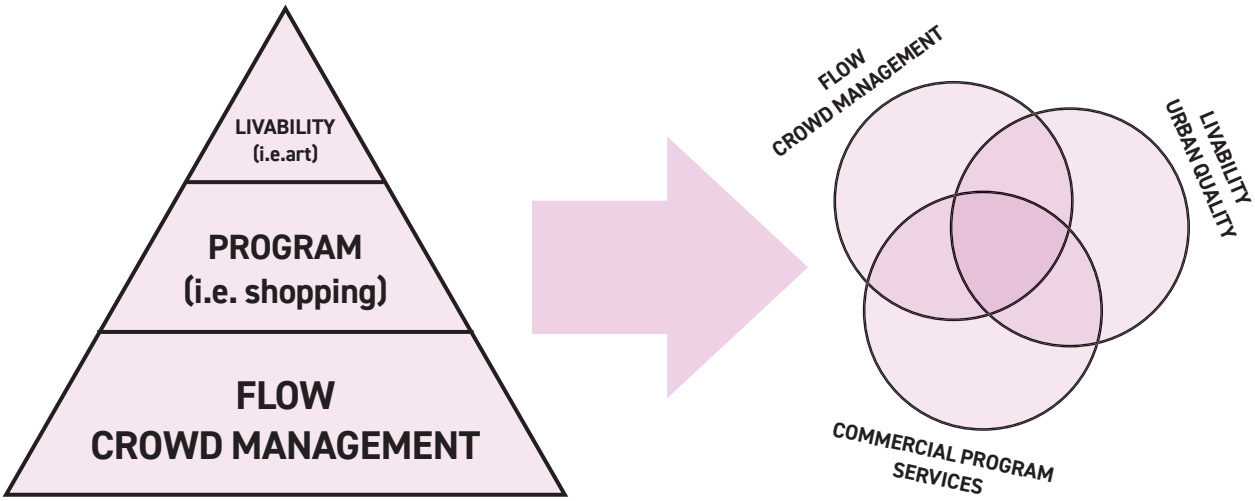
A key component in this recipe is the seamless integration of commercial programs into the station areas. Not just as convenient kiosks and newsstands to cater busy travellers, but also grocery stores, chain stores, hotels, cinemas, food courts, restaurants and cafés. Just as most airport terminals, there is a strong commercial programming – almost a shopping mall. Although the commercial program clearly is at a lower hierarchical layer than the flow, crowd management and traffic programs, it can transform the main train station areas into something more than just 'traffic machines'. It is not a public space as other places in the city, since it is clearly gated, semi-private and regulated, but it is a hybrid of urban, commercial and transit spaces.

Moreover, all the station areas encompass opportunities for mixed use urban development of offices, residential programming, public services and plazas. This transit-oriented development approach furthers the shift of the station areas from 'traffic machine' to urban district, however, still without abandoning the main purposes of transit and transfer.

A strong architectural motif at all three station areas is the gathering of all traffic functions, commercial programs and spaces under a single roof in one megastructure of many juxtaposed and stacked bodies. Besides the obvious comforts of being able to travel efficiently and sheltered from weather, it provides calmness, a sense of safety, order and coherence that makes the choice of public transport and green modes of mobility even more attractive.

Finally, at strategic locations in station areas the use of decoration, art and media installations are used to further underpin the hybridity of the space. In the metro underneath Amsterdam Centraal, there is for example a large screen installation showing a new landscape every day while forecasting the weather. This is both distraction of the fact that we are travelling deep underneath ground, without fresh air and natural light, and it is a bit of green, although artificial, choice, that softens the hard surfaces within the environment of the metro.

The large-scale architecture in the




**From a hierarchical perspective towards an integrated planning approach for future mobility hubs**

***Imagine a future train station as an extension of the inner medieval city centre, where wayfinding measures are lowering the pace of the travellers, where the shops are not fast food restaurants and where the experience of being on the go is like taking a stroll in the city***

station areas is by itself designed to be characterised by landmarks that can be seen from afar and act as lighthouses for wayfinding. But they also underpin the station areas as a distinct part of the urban fabric, thus bringing counteraction to the city's other more historical landmarks. In Utrecht the main plaza next to the station complex is covered with a tall, white roofing on high pillars and with a bubble-like structure. In Arnhem, it is the station building itself that is the landmark with its curved and organic silver-clad shape.

The use of these small- and large-scale artistic installations and landmarks embedded in the stations areas contributes to the transformation of generic transit and commercial space into places with atmospheric character and spatial qualities. This overall brings the station areas we have visited in this study tour one step closer to moving beyond the traffic machine and to start flirting with the feel of liveable and vibrant urban and public spaces in the city.

## BRINGING IT ALL INTO THE FUTURE

The train station in Aarhus has approximately 30,000 transfers every day and is in that way mostly comparable with the one in Arnhem with its 38,000 transfers per day (although Arnhem city itself is only half the size of Aarhus).

Being a relatively small hub in a larger city should hopefully make it possible to break down the hierarchy explained in the pyramid figure, and start working in a more integrated way by combining crowd management with commercial programming and urban quality. With this mindset, the transition from the urban landscape to the traffic machine could potentially be postponed to the moment the passenger is about to board the train or even be eliminated.

Imagine a future train station as an extension of the inner medieval city centre, where wayfinding measures are lowering the pace of the travellers, where the shops are not fast food restaurants and 'grab and go' concepts, and where the experience of being on the go is like taking a stroll in the city. Could this be achieved while still maintaining efficiency and flow, however, at a slower pace? Could this be the train station of tomorrow?

**FYI**
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# How to Grow Smarter

## Stockholm uses shared mobility to reimagine shared space

Sweden's capital is using innovative new mobility schemes to reclaim space swallowed up by parking to create more liveable housing developments and leaving its citizens with more disposable income in their pockets. **Esben Pejstrup**, **Paul Fenton** and **Olle Krönby** take up the story

Parking space provision and the high associated costs are coming under increasing scrutiny. Some costs are clear, particularly in urban areas where parking takes up scarce space, which could be used for other purposes.

In Sweden, developers are required to provide 'adequate' parking spaces per apartment when building new housing – known as the P-requirement. While a specific P-requirement has never been set in stone, depending on closeness to the city, access to services and public transportation connections the standard is between 0.3 and 0.6 parking spaces per apartment.

Stockholm is trying to change this.

In 2015, the Swedish capital began its leadership of the European project GrowSmarter funded by Horizon 2020's Smart Cities and Communities 'Lighthouse' Programme. The idea behind the project was to respond to citizens' needs, to reduce their environmental footprint and to provide other cities with valuable insights on smart solutions and to bring these to the market.

In the same year, in line with its vision to become fossil fuel-free by 2040, the city introduced a new policy tool, the so-called Green Parking Index, to enhance mobility in the city and free up space

## Green Parking Index

**Providing alternative mobility services can reduce the required parking provision by 10-25 percent**

**10 percent discount if the following is provided:**

- Information package.
- Quality easily accessible bicycle parking
- Access to car sharing.

**15 percent discount if the following is provided (in addition to the above):**

- Bicycle sharing.
- Free trial access to public transport.

**25 percent discount if the following is provided (in addition to all the above):**

- Service boxes (some with cooling facilities) for the storage of home deliveries.

traditionally taken up by a ubiquitous item in any city: parking spaces. The Index is designed to reduce the need for parking spaces by rewarding developers who offer alternative forms of transport to residents when constructing new residential properties.

### WORKING WITH NEW POLICY

Stockholmshem, the largest housing company in the city with more than 28,000 apartments, wanted to test ways in which to lower the P-requirement as part of their participation in GrowSmarter. For Stockholmshem, a municipally-owned company, there were numerous reasons to do so. Besides the opportunity to save money on parking spaces, the company recognized a chance to lower $CO_2$ emissions, increase the amount of space they could use for other purposes such as 'green areas' or new housing, reduce traffic in the neighbourhood and realise social benefits by providing car-sharing for residents in their buildings.

In the neighbourhood Valla Torg, Stockholmshem was renovating existing residential buildings as part of GrowSmarter. Stockholmshem provided residents of these buildings with access to a cargo and e-bike pool and added a car-sharing pool with two electric cars in cooperation with the e-mobility company MoveAbout, which operates car-sharing stations across Sweden and Norway. Introduced in 2018, it was – and is – possible for anyone to use the cars, but all tenants in the buildings included in the GrowSmarter project receive free membership and only pay a fee while using the service. By testing the principles of the Green Parking Index in an existing setting, Stockholmshem has gained valuable insights into how to deliver mobility services and reduce P-requirements for new or planned developments.

### HOW DID IT WORK IN PRACTICE?

Since installation in 2018, the electric cars have been widely used by the residents of Valla Torg. Statistics from the GrowSmarter project reveal that the two electric vehicles travelled a distance of more than 43,000km between February 2018 to August 2019 with 35 local residents signing up for and using the car-sharing pool in addition to more than 200 members from elsewhere in Stockholm.

The electric cars were generally in high demand and, during weekends, it was often the case that the service was fully booked. If the distance travelled by the electric cars would have otherwise been done in privately owned mid-size petrol cars, the $CO_2$ savings amount to 8.3 tonnes of $CO_2$.

However, the success of the solution is about more than just the number of users and $CO_2$ reductions, it is about encouraging behavioural change and having citizens ask themselves: Is it really necessary to own a private car? Can Stockholmshem plan for new housing developments with fewer parking spaces when developing property in the future? The answers appear to be yes. In a survey recently carried out by GrowSmarter one in six residents who responded had less interest in owning a car since the electric car pool and an adjacent bike pool were established.

### MORE DISPOSABLE INCOME IN THE POCKETS OF THE RESIDENTS

Car-pooling also presents another convincing argument for residents. The price of owning a mid-size car in Stockholm, according to 'Bilsvar', a service provided by the Swedish Consumer Agency and the National Energy Authority, is approximately 375 euros a month, excluding parking. In comparison, membership in the car-sharing pool costs around €11 euros with each hour costing an additional €7.40.

Thus, it would take 49 hours of driving per month before owning a private car is the most affordable solution. Creating a car-sharing pool just outside the door of the residents in Valla Torg was therefore also about providing economic benefits for the tenants in Stockholmshem's buildings by making it unnecessary for them to own and cover the full cost of a private car.

***The idea behind GrowSmarter was to respond to citizens' needs, to reduce their environmental footprint and to provide other cities with valuable insights on smart solutions and to bring these to the market***



Valla torg Carpool – March 2018

All photos: https://www.flickr.com/photos/growsmarter/albums/72157666943080378

***However, the success of the solution is about more than just the number of users and $CO_2$ reductions. It's about encouraging behavioural change and having citizens ask themselves: Is it really necessary to own a car?***

***Following the positive uptake of the car-pools in Valla Torg, Stockholmshem is already planning to add mobility measures, including e-car pools, to planned new developments***

## A FUTURE FREE OF PARKING

Following the positive uptake of the car-pools in Valla Torg, Stockholmshem is already planning to add mobility measures, including e-car pools, to planned new developments. ¬¬¬-With 28,000 apartments alone owned by Stockholmshem, the potential is certainly there to upscale this even further by introducing similar solutions to existing housing stock.

One issue that will need to be addressed in Valla Torg is how make this approach cost neutral, when initial funds through GrowSmarter (which covered membership fees for the car-pool) cease at the end of 2019. One of a number of possible business models includes Stockholmshem covering the fixed costs of the car sharing company in exchange for some of the income generated.

When it comes to applying the Green Parking Index to new developments, rather than in existing ones like Valla Torg, the business case has been proven strong by the attractiveness of the car-pool in GrowSmarter. The challenges remaining with new developments are determining which mobility services or other factors are best suited to achieve the discount on parking places and how to ensure mobility services over the long term.

Freeing up car parking spaces through shared transport schemes has the potential to considerably increase the attractiveness of cities and to reduce their vulnerability to the consequences of climate change. Stockholmshem has successfully shown that this is a viable and indeed attractive option. Making sure through policies like the Green Parking Index that other housing companies, both public and private, model this approach of choosing mobility over parking will be key to achieving a dramatic change in the urban environment.

### GrowSmarter

GrowSmarter is a five-year collaboration between eight European cities and industrial partners showcasing smart solutions for sustainable urbanism. Stockholm is one of the project's three demonstration cities alongside Cologne and Barcelona with 12 smart solutions implemented around the city.

The focus of GrowSmarter is to develop low energy districts, integrate both active and passive infrastructure networks and improve sustainable urban mobility.

The project finishes in December 2019 after five years.

More information: **www.grow-smarter.eu, or Twitter.com/EUGrowSmarter**


**Valla torg Carpool – March 2018**

**FYI**

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**Théo Fievet** on how Lille Metropole combined the introduction of a restrictive low emission zone with a large investment plan for public transportation.

# Stick, meet carrot

As the fourth largest French metropolis and the most rural one, the 1.2 million inhabitants of Métropole européenne de Lille (Lille Metropole) are spread over 650 km$^2$ territory. This gives Lille Metropole a relatively low density (1,762 hab./km$^2$ compared with Lyon Metropole's 2,568 hab./km$^2$).

This large territory including 90 municipalities around three main urban centres that concentrate most jobs *implies* rather long commuting distances. The average 6.8 km between homes and workplaces along with high share of liberal professions and intermediate- and senior-level individuals using cars for professional purposes keeps car ownership and car user rates high at the expense of air quality and traffic fluidity.

Poor air quality is costly in any European city. In Lille Metropole we evaluated about 1,689 premature deaths due to poor air quality and an estimated cost of €5 billion per year for the local economy. Lille Metropole has already taken steps to tackle this by running (almost) the entire public bus fleet on natural gas (NGV) produced with local organic waste, and through large deployment of electric vehicle charging stations.

Lille Metropole decided to go two steps further at once. A restrictive Low Emission Zone (LEZ) alongside a massive €2 billion investment plan for short- and long-term public transport infrastructures and services, both


> ***Lille Metropole decided to go two steps further at once. A restrictive Low Emission Zone (LEZ) alongside a massive €2 billion investment plan for short- and long-term public transport infrastructures and services***

voted for on the same day in June 2019. How do these two measures work together? And why was it necessary to combine them? What are they really about? How inclusive are they?

## A RESTRICTIVE LEZ FOR THE METROPOLITAN CENTRE

Last June, the metropolitan council has decided to engage Lille Metropole alongside voluntary cities and the State in the progressive implementation of a LEZ. Depending on further technical and political decisions, notably final discussion on implementation with local mayors of concerned municipalities, the LEZ should be operating by 2021. The LEZ will indeed lay on the 11 most urban municipalities (Lille and its neighbour cities) among the 90 composing the metropolitan territory. This represents 340,000 people and 60 km$^2$ (compared with 25 km$^2$ in Antwerp, 84 km$^2$ in Paris for examples). Restriction will be 7/24 to ease readability and enforcement. It will include national highways passing across the zone.

Although Lille Metropole is not listed as a critical area in terms of air pollution, funding was granted at national level for enforcement measures and communication programmes.

Unlike the 160 km$^2$ wide LEZ in Brussels, Lille's does not cover the whole territory but only its biggest urban centre. The territory has indeed the specificity of being composed of three urban centres, the other two being the cities of Tourcoing and Roubaix. Measures were necessary not to divide the area and its inhabitants into two. Indeed, LEZs have many advantages and are unsurprisingly mushrooming over Europe. However, opponents raise some particularly relevant points in the tension social climate in France and Europe: LEZ is less of a constraint for dwellers of urban centres where it is effective than peri-urban and suburban ones who uses their own car for accessing city centres. In Lille Metropole, 23 per cent of cars (estimation of the fleet of vehicles in 2016 based on the results of the survey on inhabitants' travel habits aged 5 and over) would be banned from accessing the LEZ impacting those unable to purchase a more recent, cleaner car leaving in the outskirts. Although less wealthy populations are less motorized and commute shorter distances, risks are still high to exclude the less wealthy car owners from accessing city centres leading to situation of social exclusion based on wealth.

A permanent LEZ surely has a significant impact on air pollution due to road traffic: nitrogen oxide levels will be diminished by at least 31 per cent and up to 36 per cent for PM2.5 inside the LEZ; these particles will also fall outside the zone and over the whole MEL territory (650 km$^2$) with a respective diminution of 17 per cent and 22 per cent

Combining the LEZ with investment plan for public transportation was therefore an absolute necessity. New lines will supply the territory, transform landscapes and concerned municipalities, as well as increase traffic fluidity within the whole metropole in easing mobility for all. Traffic efficiency, air quality, and economic attraction will benefit from this 'mobility shock'.

## LARGE INVESTMENT PLAN TO CONNECT THE DOTS

**Consulting users and stakeholders**

Launched in early 2019, an online public consultation asked inhabitants about their needs. Building new backbone lines with better performances to complete the existing services, new park-and-rides and multimodal facilities, and strengthening regional railway network were the most common answers of thousands of respondents.

Solutions based not on hard new infrastructures but on better managements were also polled: 'bus only' lanes, a better distribution of space between mobility modes. These answers were deeply considered in designing new services.

Since the integration of urban transport networks and railway systems is the cornerstone of the investment plan, other regional and national mobility stakeholders were part of the discussions: the French State, Hauts-de-France Region, SNCF, Chamber of Commerce, Ilévia (public transport operator in Lille Metropole), the European Group of Territorial Cooperation, municipalities etc. As of today, thoughts are still being shared for a common, large and strategic vision based on railways at regional level.

**Interconnecting urban and railway networks for in inclusive metropole**

Lille Metropole is heading toward an ever-more urban regional railway network. Regional train systems must be designed taking subways, trams and buses into consideration.

Almost 30 projects lay ahead for Lille Metropole, all based on a few principles: support economic and urban development, ease access to urban core centre from outside, and connection between outskirt areas so that no one is left behind by the LEZ. In total, including studies and long-term projects, between €1.8 billion and €2.5 billion will be invested.

By 2025 the earliest, five new tramway lines will be ushered to connect popular districts with subway stations; in addition, high-level service buses will be deployed to connect outskirts areas to each other. For the busiest lines, trams and buses with capacity to transport larger number of travellers will be provided and/or frequencies for a potentially smoother accession in the LEZ will be risen. Moreover, cross-border lines will be reinforced in readability and frequencies and new connection added.

In the long term, the interconnection between urban networks and regional railways will be completed to reduce

***Almost 30 projects lay ahead for Lille Metropole, all based on a few principles: supporting economic and urban development, easing access to urban core centre from outside and connection between the outskirts of the city so that no one is left behind by the LEZ***

Pascaline Chombart

**Aerial picture of Lille**

traffic in the main Lille station. To do so, nine multimodal hubs and park-and-ride facilities will be built nearby rail stations, the doorways of urban centres. New rail stations, especially in the south of Lille, will blossom. The existing subway line to the South will be extended to reach out the most peripheral areas. The railway system will also participate to the connection between suburban areas with "diametralization" of some lines.

Automatic and connected transport is already being implemented and will be set-up on some section in urban areas.

## SEEKING SYNERGIES AND COMPLEMENTARITIES

These two new significant urban measures, the LEZ and the investment plan for structural collective transport, are integrating a larger, coherent set of initiatives for a better and cleaner urban environment. Car owners willing to change for a cleaner car are already supported, under certain conditions, by French States, and this resulted as an important factor in voting the LEZ. Lille Metropole is also engaged to reflect on how to accompany impacted car users toward shifting transport mode.

These decisions on mobility and infrastructures projects will contribute to the improvement of air quality in the context of a broader environmental health policy whose action plan was also voted on in June 2019, as well as in connection with the development of the PCAET, the revision of the Urban Travel Plan initiated, etc.

LEZ and infrastructures projects are far from the only contributors to improving the quality of the air in the territory. It is necessary to combine actions in multiple domains. The LEZ and investment plan are concrete example of a long-term strategy launch in 2018 for a healthier environment, the Sustainable Energy and Climate Action Plan (SECAP). The "Plan santé environnement" - voted in 2018, pushed for more coherent urban policies anticipating negative externalities at a cross-sectoral level. These cross-silos methods allow coherence and avoid over-lapping, contradictory measures. Public health must be supported through prevention and promotion on which Lille Metropole can have an impact rather than measures taking in reaction outside of Lille Metropole's competences.


Lyon, Stockholm, Bordeaux, Lille, Melbourne, Hyderabad, Rennes and Boston count themselves among more than 20 major cities that have chosen Keolis to operate all or part of their public transport networks

*Vincent Lecigne*

## MANY SOLUTIONS, ONE METHOD

Challenges facing urban mobility are many, but there are plenty solutions for each difficulty. It is widely agreed that one solution will not answer all challenges. Plans presented here are one possibility out of many. However, the method must remain on the same lines: a strong coherence between all solutions selected by a consultative process and implemented through close cooperation between all concerned public and private actors.

Large financial investments are part of the solution, we must face it. However, big money is nothing without big minds: public strategies to shift travellers, commuters and transporters' behaviours, like LEZ and smarter public transportations, are another essential part of the puzzle. Both must be considered together to ensure clean, but also socially inclusive, mobility for tomorrow.

**FYI**

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**https://www.lillemetropole.fr/sites/default/files/deliberations/19_C_0392.PDF**

**https://bit.ly/332Q4ev**

# All will be ReVeALed

Denilo Vieira via Unsplash

**How cities can learn to fall in love with Urban Vehicle Access Regulations: through its 'matching' Transition Framework, ReVeAL will guide cities on how to become more liveable**

With almost 70 per cent of the world's population expected to be living in urban areas by 2050, the task of making cities not only accessible but above all liveable, is becoming essential. It is indeed a truth universally acknowledged that cities are becoming more and more of a social and economic magnet: jobs, housing and services aggregate at once, and we, the people, are attracted to these magnetic fields as if we were metallic objects.

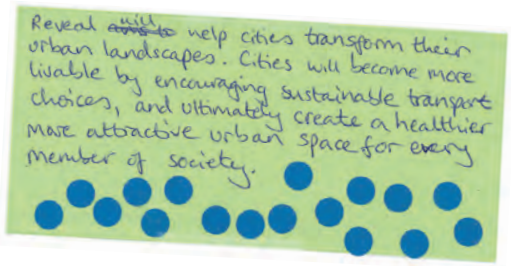
However, the unprecedented increase in population, rather than entice, does scare most – especially authorities, urban and mobility planners and city managers, who are consistently challenged with new risks concerning congestion, air pollution, noise levels, accessibility and infrastructural damage. To cope with these urban pressures, cities around the world are trying to take a stand where it is needed – and regulating the vehicles or trips that access parts of the urban area is one for the ages.

## THE UNREQUITED LOVE FOR URBAN VEHICLE ACCESS REGULATIONS

Urban Vehicle Access Regulations, also known by the acronym UVARs, can be defined as 'measures to regulate vehicular access to urban infrastructure[1]' – a wide spectrum of techniques and actions that cities can adopt to tackle urban traffic related issues. Low and Zero-Emission Zones, spatial interventions, pricing measures and other emerging technologies fall in this category and cities can leverage them to improve urban environments and citizens' lives.

It may, therefore, come as something as a surprise to learn that UVAR schemes have not only become a highly relevant theme in the day-to-day conversation of most European cities, but also a very controversial one. Usually, authorities see them as useful tools and regulations, while citizens, particularly vehicle and business owners, perceive them more as restrictions or bans. The former see the "do's"; the latter see the "don'ts": a one-sided relationship, to say the least.

In addition, examples of both successful and unsuccessful implementations are numerous and set the ground for further contention. Cities focus on successful implementations in the hope that, by blandly replicating good practices, the chances of a positive outcome of their own UVAR measures would increase. However, many factors play a role in the success of UVARs and factors that are intrinsic to each city need to be understood in order to determine if a specific practice is applicable or not, case by case.




ReVeAL Consortium

**ReVeAL pitch**

## UNDERSTAND YOUR CITY AND THEN TRANSFORM IT

The key to a successful UVAR is understanding the context of the city where there is a need and will to implement it. Identifying the different variables of the city affecting – in one way or another – the UVAR implementation and assessing the maturity of the city with respect to the lifecycle of its proposed UVAR measure are then the main steps to undertake to clarify the possible following paths that will result into a successful and targeted implementation.

It is in this moment that the ReVeAL (REgulating VEhicle Access for improved Liveability) transition framework comes into place. It groups the key procedural and contextual factors affecting the development of an UVAR measure into four areas, capturing the processes that take place within and between these areas along the UVAR lifecycle (see The UVAR Lifecycle box). Its mapping thus leads to the explicit understanding of the transitions that these four areas may undertake within a specific context and help identify the different paths that could be covered.

The four transition areas are:

- Governance and financing (legal, political, procedural issues, and UVAR financing mechanisms);
- User needs and acceptance (mobility demand, acceptance of regulation, willingness to pay, value of time);
- Mobility services and concepts (landscape of new mobility services and schemes – MaaS, shared vehicles, etc. – together with existing elements:

**NOTE**

1 NBGD n° 2 "Vehicle Types, Exemptions and (Cross-border) Enforcement of Successful Urban Vehicle Access Regulations (UVAR) Schemes across Europe"

***UVAR schemes have not only become a highly relevant theme in the day-to-day conversation of most European cities, but also a very controversial one***

## Congestion tax: Stockholm vs. Gothenburg

In 2006, Stockholm introduced the congestion tax, a time-of-day dependent cordon-based congestion charging system with the aim of reducing traffic and congestion, enhance accessibility, and improve the environment. The measure was initially launched as a half-year trial followed by a public referendum in which 53 per cent of the citizens supported the measure.

Along the same lines, on the first day of 2013, Gothenburg introduced its congestion tax. This with the aim of alleviating congestion, improve air quality, and generate revenues for transport infrastructure. Several consultants, officials, and Stockholm experts were participants in the design. At the end, and just as in Stockholm, the system consisted of a single cordon surrounding the city.

In 2014, 20 months after the introduction of the Gothenburg congestion tax, a local referendum was held, with a 57 per cent of the citizens voting against the congestion tax. These results were finally withdrawn by the city's government arguing the lack of policy alternatives to replace the congestion system.

Although the public approval of the Gothenburg congestion charge has increased since its implementation, reaching an approval of 51 per cent in 2014 – the maximum since its implementation up until 2017, the approval rate has never been remotely close to the acceptance rates of the Stockholm congestion tax with approval rates of up to 70 per cent during its following years after implementation.

The implementation of the congestion tax in these two cities is the perfect example of how two cities with relatively the same cultural, social, and legal context, may display different processes with different outcomes – in terms of political and public acceptance. This showcase how important results to consider the various procedural and contextual factors in order to reach a successful UVAR implementation in a specific city.


**ULEZ in London: Low Emission Zones are often the most effective measure that towns and cities can take to improve air pollution**

Shutterstock

public transport, active travel);

- System design/technology (data-driven planning, smart enforcement systems, connected traveller, etc.).

### TRANSPARENCY MATTERS

Who has a voice in the decision process? How are decisions made? And who is being held accountable once a decision has been made?[2] Governance, as defined by the OECD, is 'the exercise of political, economic and administrative authority necessary to manage a nation's affairs[3]' and characterised by 'participation, transparency, accountability rule of law, effectiveness, equity etc.[4]'

Within the ReVeAL transition framework, good governance implies transparent procedures for project management, and procurement and allocation of revenues at the local level. It also brings to life policy and operational coordination between different levels of government and translates into a professional project management of the UVAR scheme, with long-term measures that are institutionally anchored to agencies or public-private partnerships.

More specifically, financing within the ReVeAL transition framework requires the very same kind of transparency that good governance should already bring to the table. Referring to the way UVAR measures are funded and revenue streams are used, transparent financial allocation is indeed an important asset to UVAR implementation, as the understanding of how revenue streams from UVAR (from fines or fee collection) are spent improves the citizens' acceptance of the scheme.

### THE *QUID PRO QUO* OF USER ACCEPTANCE AND POLITICAL CONSENSUS

Within ReVeAL, user needs refer to the identification of the degree to which users can understand how an UVAR functions, while city managers and authorities assess and monitor the social, economic and demographic differences among them. Throughout the process, communication and engagement with the targeted

## The UVAR lifecycle

To assess the maturity of the city with respect to its UVAR implementation process, the ReVeAL transition framework divides the UVAR lifecycle into a series of four (4) phases and three (3) gates. Thus, the phase in which a city can be found with respect to its UVAR implementation is a direct reflection on the maturity of its UVAR endeavour.

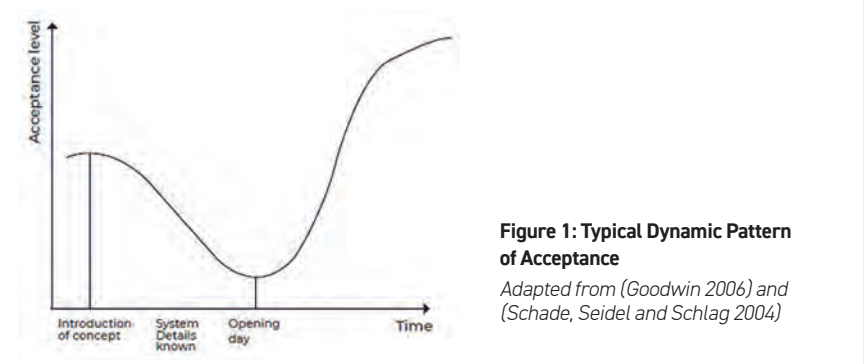
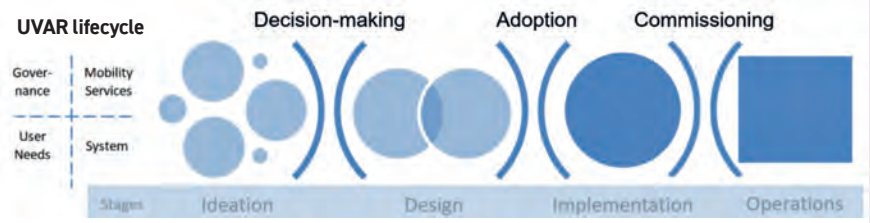



**Figure 1: Typical Dynamic Pattern of Acceptance**

*Adapted from (Goodwin 2006) and (Schade, Seidel and Schlag 2004)*




The phases correspond to different periods of time that involve a set of activities and processes, whilst the gates are specific points in time defined by a set of specific events that determine the passing or nor to the following phase. The four phases and three gates are defined as:

- **UVAR Ideation phase:** Time span in which problems come to the attention of governments (Agenda-setting) and a set of feasible solutions emerges in response. It leads to the UVAR design phase through the Decision-making gate.
- **Decision-making gate:** The selection of the UVAR measure/s is made at this point.
- **UVAR Design Phase:** Time span by which UVAR measure's designs are developed in more detail and multiple designs and alternatives, as well as communication strategies, may be considered. It leads to the UVAR Implementation phase through the Adoption gate.
- **Adoption gate:** The legitimization (approval of implementation) of the UVAR measure takes place here.
- **UVAR Implementation phase:** Involves executing the policy option selected at the decision-making phase. This involves all the necessary action to put the UVAR measure into practice. It leads to the UVAR operational phase through the Commissioning gate.
- **Commissioning gate:** Final decision needed for the full-scale implementation/operation is made at this point.
- **UVAR Operational phase:** Here all the activities following the launching of the UVAR measure (full scale) take place. This may include the monitoring and evaluation of the measure, the coupling with new UVAR measures, feedback collection and design fine-tuning, etc.

user groups result essential to understand and explain the new scheme and make user needs to be heard.

*User acceptance* is then the willingness within a group to use a UVAR system or measure for the tasks for which it was designed, and it is affected by the design characteristics of policy measures and individual mechanisms of reception and elaboration. Unsurprisingly, it relates also to political acceptance: thus, understanding how user acceptance develops over time is essential for creating political acceptance/consensus.

Monitoring and measuring public acceptance should also be performed periodically and adaptations can be proposed by users. In doing so, it is important to understand and address questions regarding equity, fairness and self-interest and how it affects level of acceptance in both policy design and communication. Specifically, equity refers to how the costs and benefits resulting from a measure are distributed over the population, whereas perceptions of fairness are individual.

## MOBILITY SERVICES AND CONCEPTS THAT MAKE THE CITY OF YOUR DREAMS A REALITY

MaaS (Mobility as a Service), automated and/or electric shuttles, new public transport options, ride hailing platforms, application of C-ITS (Cooperative Intelligent Transport Systems), shared bikes, cars, vans and mopeds, (cycle) logistics schemes: these are just some of the mobility services and concepts that can support the ideation, implementation and operation of a specific (or a set of) UVAR measure(s) in a city/metropolitan area within the ReVeAL framework , in combination with existing elements, such as active mobility and public transport.

This stream of functions and measures should then be harmonised with the availability, functionality, and status of UVAR-related systems – and the technologies that make up these systems – in a city throughout the UVAR life cycle, also known as the system design/technology transition area. Clusters of this part of the project are, as following:

- Curb-side management (Parking): Parking is one of the most commonly used means to regulate access to urban areas. When implementing UVAR, parking places, policy, control, and dynamic payment mechanisms should be aligned and supportive of UVAR.
- UVAR Technology (Enforcement): UVAR enforcement requires an overview of the different technological options that could be used to regulate access in urban areas while considering the interoperability, reliability, and privacy of these alternatives.
- UVAR Technology (Communication): Communication and the use of information are crucial when implementing UVAR schemes – using different channels for effective information can mitigate criticism and lead to successful and smooth implementation.
- Traffic management systems: Data applications used for traffic management support UVAR measures during their development. Knowing the capabilities of these installed systems reflects the awareness and control a city may have over its own UVAR scheme.
- Infrastructure: UVARs require a dedicated infrastructure for targeted modes (EV charging stations) to impulse a modal shift, and a dedicated infrastructure for communication (VMS), necessary for traffic information management and control.

## THE ART OF MATCHING

UVARs are not everyone's cup of tea, but that does not mean that they cannot find a city that will love and cherish them. For as much as the ReVeAL transition framework is an adaptation of a multi-stage and multi-stream model, where politics, policies, and problems are intertwined and matched with the public policy process itself to maximise the suitability, adaptability and replicability of UVAR measures, it is also a clear way to harmonise cities and UVARs in a proactive and successful relationship.

This harmonisation – which works as a sort of coupling/matching, finds its strength into the assessment of each and every city involved, thus facilitating comparison between different cities, identifying the specific contexts and common transition paths that could be then followed and replicated.

It is a targeted guidance, a non-arbitrary Cupid's arrow that matches the intrinsic characteristics of a city to the most suitable UVAR measures alternatives and, actually, *does The Magic*.

**NOTES**

2 https://iog.ca/what-is-governance/
3 https://stats.oecd.org/glossary/detail.asp?ID=7236
4 https://stats.oecd.org/glossary/detail.asp?ID=7236

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The ReVeAL (Regulating Vehicle Access for Improved Liveability) project will help to add Urban Vehicle Access Regulations (UVAR) to the standard range of urban mobility transition approaches of cities across Europe. For more information on ReVeAL visit:

**http://www.civitas-reveal.eu/**


# More thought required

**Itai Dadon** looks at how cities can conquer the pitfalls of Smart City Transformation

Cities that are undergoing digital transformation initiatives have overcome a common set of challenges. While each environment is different, the process of becoming a "smart" city requires a comprehensive approach that involves combining technology and infrastructure modernization, security enhancement, financing and organizational change. Many of the world's most iconic cities like Copenhagen, New York City, Paris and Singapore are leading the way. By taking a platform approach and fostering collaboration across key internal and external stakeholder groups, these cities are laying the foundation for digital transformation. Other cities have had visions, but struggle to put plans in place.

"Projects may not even get off the ground because of a delay in getting the concept down on paper; may fizzle out when highly capable people hesitate about getting involved because of a 'nervousness of the new'; or may be stymied during implementation by the

***Cities need a trusted partner that offers technology, expertise and services to truly understand the risks to their critical infrastructure systems and determine the right strategies to mitigate risk***

many competing stakeholder interests involved," said a speaker at Singapore Management University.

But while the reasons that smart city plans stall out are myriad, they typically fall into four groups, relating to technology, funding, security and collaboration.

## AN ABUNDANCE OF TECHNOLOGIES

Given the diversity of needs in today's connected cities, no single technology can offer an optimal mix of performance, reliability and cost.

As one example, look at three components of a city's infrastructure: 1) backhaul, which connects the field area network to the wide area network, typically has a combination of cellular and fiber optic technologies; 2) Field Area Networking (FAN), which is the technology behind a city's wireless network canopy, where multiple standards and proprietary technologies such as Wi-SUN and 3gpp are competing for mindshare today; and 3) edge communications, which enables collaboration between endpoint devices, can use a variety of standard wired or wireless communication media such as Wi-Fi, Bluetooth, Ethernet or Analog.

The city of the future must be able to seamlessly integrate a wide variety of connected solutions from an ecosystem of smart city solution providers. This intelligent connectivity platform requires a trusted partner with expertise in a variety of connectivity media.

Yet, bringing all of these components together in a unified system can be a technical challenge that many cities are not prepared to face. For a city manager or CIO, understanding the different capabilities and requirements of these diverse technologies can be confusing and can forestall decision-making.

Lack of a clear strategy to deploy and integrate multiple, sometimes incompatible technologies makes it difficult and risky for a city to get started. Or, when cities use a trial-and-error method, they may deploy one standard or technology for a particular use case, but after major investments, followed by live-network testing, they may find it's not the right technology for that use case. For planners, that creates challenges as they consider implementing smart technologies.

Then there are back-office IT systems to contend with: creating a unified smart city platform also requires that back-office IT systems connect applications and data systems to each other across multiple operating units. This may require significant investment in systems integration to connect legacy infrastructure and enable future applications with access to a single data warehouse.

And finally, how do planners model the data collected from all the devices? How do they create an interoperability of the information across cities and not just within the city (many of us cross multiple cities every day)?

Cities that have already made significant investments in "smart" technologies must consider how all these new solutions will work with their legacy infrastructure.

## FUNDING

Access to funds for any specific project can be a big challenge for many cities. Putting in place creative financing options can enable projects in many cases. One example is the PPP (public-private partnership) model, but the multiplication of parties involved can also create a bureaucratic nightmare.

## FUNDING [???????]

Even when funding for smart city investments is available, there's an opportunity cost that comes into play. Complicating matters, planners often lack an understanding of the ROI on their applications, since many smart city use cases deliver environmental or social benefits that can be difficult to quantify. And yet a prerequisite to gaining funding is the ability to calculate a clear, data-driven ROI on an investment or business case model. Without it, the city becomes more of a testing ground, with all the attendant risks.

Now, carriers are looking to cities to provide them with access to physical mounting assets for network equipment. In turn, the carriers are offering to expedite the roll-out of next generation services. Competition for this real estate is fierce, which is pushing some carriers to offer subsidized services in exchange for access. Streetlights, for example, are valuable mounting assets for IoT network canopies and other edge devices. Cities must carefully consider how such decisions will fit into their big-picture modernization strategy.

***The reasons that smart city plans stall out are myriad but they typically fall into four groups, relating to technology, funding, security and collaboration***

***It's been said that: "what can go wrong, will go wrong." The corollary to this admonition is "understand what can go wrong, and it won't go wrong." Smart city planners might do well to live by that rule***

## SECURITY

All cities are exposed to a range of cybersecurity threats. In this environment, a single smart city vulnerability, when exploited by an individual or organized group, may put critical infrastructure systems at risk. Arguably, the challenges are twofold: learning the security and privacy concerns of the community, and identifying and addressing system-level vulnerabilities.

Now consider that as cities become "smart," they also connect more "things" – not only devices, but also applications. Cities' awareness of these risks is growing as cybersecurity hacks happen and private information is exposed. The problem is that most cities aren't well equipped to identify and address their vulnerabilities.

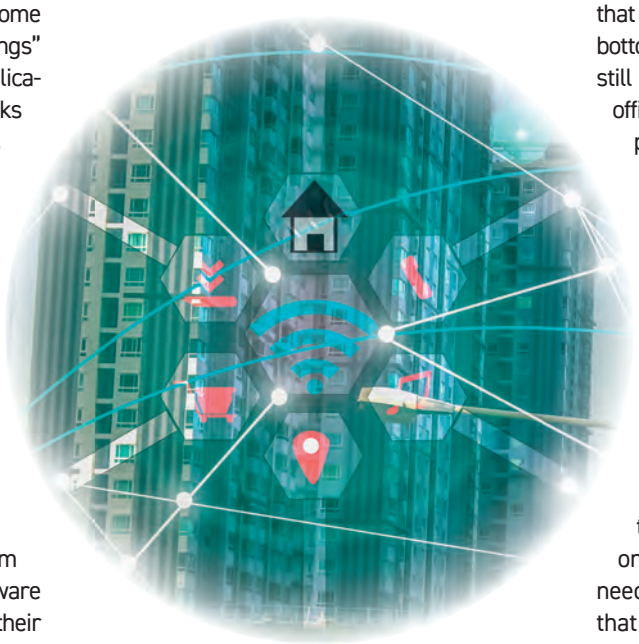
Cities need a trusted partner that offers technology, expertise and services to truly understand the risks to their critical infrastructure systems and determine the right strategies to mitigate risk.

Only then can cities put in place an end-to-end military-grade system comprised of secure hardware, software and communications to minimize their exposure and prepare them to respond rapidly in the event of a breach.

## COLLABORATION

Collaboration, or lack thereof, is another major concern that continues to thwart the implementation of comprehensive smart city plans. In many cases, cities are investing in smart technologies to address the near-term tactical needs of single departments. This uncoordinated decision-making can lead cities to invest in multiple redundant systems. In the ideal scenario, cities should take a strategic view to ensure that the technology investments they make can all be linked together in a unified system. This platform approach empowers individual departments to leverage a common set of connected assets.

To maximize return on investment, smart devices should support multiple areas of city operations. The possibilities are limitless, but cities need a platform that allows multiple end-user applications to connect and control a common set of devices. Following are a few examples of how these devices can provide value across a variety of city departments and operational areas.



Smart cameras can monitor intersections to generate real-time traffic information. Transportation departments can use this information to optimize traffic signal timing. However, this information can also be leveraged to improve other city services, such as lighting. With access to real-time traffic information, lighting departments can fine-tune dimming patters to reduce energy use.

Similarly, noise sensors provide valuable information about what's happening on the streets in real-time. Police departments can utilize these sensors to enhance public safety with applications like gunshot detection. Likewise, transit departments can leverage the same sensors to detect crashes on the roadways.

Ideally, these departments can leverage common infrastructure to avoid redundancies. But they can't accomplish that if they make decisions in silos. The bottom line is that planners today are still creating multiple network and back-office infrastructures, where a common platform (built around collaboration) would be more economical and easier to manage.

## TOPPLING BARRIERS

In envisioning the ideal smart city, the ultimate goal is to enable cities to support their diverse operational needs with a single digital platform. Often, cities will start with a single high-priority use case that delivers an immediate return on investment. Yet, the platform needs to be flexible and upgradable so that multiple departments can leverage this investment to enable a wide range of use cases in the future. This platform approach is not only vastly easier to deploy and manage, but also offers a better return on investment by minimizing the cost and complexity of deploying additional use cases in the future.

**FYI**
**Itai Dadon** is director of smart cities and IoT at Itron

# Safety & Security

This section addresses road safety and the security of transport systems. It covers road safety policies, addressing all categories of road users and supporting the development of innovative solutions. It also covers technological innovations contributing to the improvement of road safety

- A New Paradigm for Safe City Streets – Polis and Eurocities launch a major initiative
- Lewisham – The London Borough of Safety




# The new paradigm for safe city streets

During European Mobility Week 2019, the European Commission and the Global Alliance of NGOs for Road Safety co-organised a Road Safety Roundtable in Brussels. Two commitments were handed over: one from the European Commission and the EU Member States, namely the target of halving the number of fatalities and serious injuries on European roads between 2020 and 2030, and one from European cities, entitled "The New Paradigm for Safe City Streets". The city declaration has been coordinated by Polis and EUROCITIES.


***Death and serious injury are not an inevitable by-product of urban mobility. Urban mobility must become both sustainable and safe. Authorities at all levels, road safety agencies and police forces must work towards the same goal. With this declaration on road safety, local and regional authorities recognise their key role in building safe systems***

*Karen Vancluysen, Polis Secretary General*

Today we have the knowledge and the means to eliminate traffic deaths and serious injuries in urban streets, and to greatly improve the quality of life and health of our citizens.

Traffic safety is a global problem in which cities have a crucial role to play. Adopting a 'Vision Zero' approach requires political leadership, strategic clarity and decisive action, as well as the ownership of all involved – elected officials, transport professionals and citizens.

We need effective solutions and a reliable paradigm for their development and deployment. A growing number of cities are taking up this challenge. We must step up the diffusion and the adoption of the principles on which their successful experience is based. Therefore,

We, the cities, recognise the following principles as necessary for sound and effective action for traffic safety:

### 1. OUR STREETS, OUR RESPONSIBILITY

Death and serious injury are not an inevitable by-product of urban mobility. Traffic crashes and risk behaviours have underlying structural causes that cities can act upon. A 'safe system' approach addresses the interaction between road users, vehicles and infrastructure on our streets. All parts of this system must be improved. If people make mistakes or one part fails, street users are still protected.

### 2. DON'T BLAME, PROTECT

People have diverse needs and capabilities. Safety policies for our streets must expect people who make mistakes, drivers who aren't fully aware of the danger their behaviour can create, as well as people who are younger, older or have disabilities. These challenges must be addressed by careful planning, realistic management, universal design, and strict enforcement.

### 3. CITY STREETS ARE NOT MOTORWAYS

Walking and cycling in city streets does not require a driver's license and isn't subject to age limits. City streets are a different environment from motor-oriented high-ways and roads and need specific safety approaches. They are the heart of our communities and must be healthy and attractive places to live, work, play and do business. The safety of a street depends on the safety provided to its vulnerable users.

### 4. MOBILITY MUST BE SAFE, OR IT WON'T BECOME SUSTAINABLE

Safety fears are often cited as the most important impediment for walking more or taking up cycling, including by parents who feel they must drive their children to school. Streets must be safe for people to embrace sustainable modes, and for cities to mitigate climate change. Improving the safety of our streets will unlock the potential for walking, cycling, public transport and a growing number of shared micro-mobility options to advance climate and air quality objectives.

### 5. SAFETY LEADS TO EFFICIENCY

Reducing speed is one of the most important things cities can do to make city streets safer. A person is about five times less likely to be fatally injured if hit at 30 km/h than at 50 km/h. Wider lanes, higher speed limits and traffic lights that favour motorised traffic are not the solution to urban congestion. Improving conditions for walking, cycling and public transport reduces the need for motorised journeys. Efficiency must work for all modes and cannot compromise the safety of some.

### 6. REDUCE RISK AT THE SOURCE

Motor vehicles, due to their higher speed, larger mass and stronger structure, are the main source of risk in city streets. Reducing the number of motor vehicles on our streets also means reducing the danger that they pose. Measures to reduce risky behaviour on the part of drivers must take precedence over restrictions on the free movement of citizens who walk, cycle or use public transport.

### 7. FAIRNESS AND FREEDOM OF CHOICE

Cars and trucks present lower risk to their users, at the expense of higher risk for other people. Decades of mobility policies favouring motorised traffic created an imbalance that generates higher risk for some modes, distorting options and reducing freedom of choice. The rise of micro-mobility has shown the impact this has, with e-scooters being used on footpaths because their users are afraid of motor vehicles, which in turn leads to safety concerns for pedestrians. Multimodality implies vulnerability and we must ensure safety for all modes.

***In Lisbon we want City streets to be places for life. People come first, and we must make sure that Active Mobility is safe and comfortable, and that vulnerable users are protected. That's a cornerstone of our Mobility policy***

*Miguel Gaspar, Lisbon's Deputy Mayor for Mobility and Safety*

### 8. THE RIGHT TO KNOW

Sound data is the basis for sound policies. Public entities must work together and allocate adequate resources to collect and analyse data on traffic safety. Civil society (including citizens, the scientific community and the press) have the right to easily access and understand relevant information about traffic crashes and the fatalities and injuries they cause. Openness about data on traffic safety is in the public interest and helps to drive improvement.

### 9. TECHNOLOGY CAN BE A PROMISE, NOT AN ALIBI

We need technology that can reduce the number of private motor vehicles and make them safer, such as Intelligent Speed Assistance. Yet technological innovation must never become a source of new constraints for pedestrians and cyclists. For example, with requirements for people and public streets to become machine recognisable. Technology for tomorrow must not delay the implementation of solutions required today.

### 10. LET CITIES LEAD

Cities that are innovating and leading in street safety efforts must be empowered to shape policies on the national and international levels, and legislation must help cities take the necessary steps to ensure safety in their streets. Cities must be encouraged to share their experience with their national and international peers and must be supported as champions for traffic safety.

We, the cities, act now.

Arad, Romania
Arnhem Nijmegen, The Netherlands
Barcelona, Spain
Berlin, Germany
Farkadona, Greece
Helmond, The Netherlands
Lisbon, Portugal
London, UK
Madrid, Spain
Schaarbeek, Belgium

POLIS
CITIES AND REGIONS FOR TRANSPORT INNOVATION

EURO CITIES

***A safe city goes hand in hand with sustainable goals. As a green and bicycle friendly city, we always strive for more walking and cycling. Improving the safety of our streets will unlock the potential for walking, cycling, public transport and a growing number of shared micro-mobility options which helps us achieve climate and air quality objectives***

*Antoinette Maas, Deputy Mayor for Mobility, "Smart City" Helmond*

**FYI**
Cities and regions are invited to sign the declaration during the Autumn of 2019.

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# All two wheel, all too real

**Liz Brooker** on how one London Borough is thinking creatively to drastically reduce the numbers of motorcyclists that are killed or seriously injured on its streets every year


Motorcyclists make up around 1% of the traffic

Over a number of years there has been great concern about the number of motorcycle riders that are seriously injured and/or killed on London's roads.

Many advertising campaigns have been carried out nationally and regionally, reminding us of the need to 'Look out for bikes', 'Slow Down' and 'Think Bike' – the list goes on. The team in the London Borough of Lewisham wanted to know more about this issue. As part of London's Vision Zero target of no deaths or serious injuries by 2041, it was felt that more information was needed to enable a new targeted programme of rider support to help to improve the awareness and the ability to anticipate the actions of other road users for the young, new rider. But who were we targeting?

## UNDERSTANDING MOTORCYCLISTS

Before launching into spending public money on an advertising campaign we commissioned a detailed Motorcycle Insight Study, Road Safety Analysis completed a study so we could fully understand motorcyclists, the reasons for the casualty numbers and most importantly how we can make it safer and how we can work towards Vision Zero in London. We were keen to create a targeted campaign that would be fully evaluated.

It is very simplistic to believe that a campaign targeting motorcyclists would reach all riders. The in-depth studies showed very different personas of rider even in close geographical areas. Four boroughs showed quite different types of riders, reasons they ride and background.

## The four personas

**Prominent Persona – from Camden**

- Early 30s, rents luxury 1 bed apartment
- Graduate of leading University, Manager of IT Company in Central London
- Uses a bike for commuting and day-to-day travel

**Prominent Persona – from Lambeth**

- Late 20s, lives in large flat with sharers
- Highly educated, works in managerial role earning a high wage and lives cosmopolitan lifestyle
- Uses small bike from time to time for commuting and in fair weather

**Prominent Persona – from Newham**

- Late 20s, lives in Victorian terraced house with wife and three young children
- Works in semi-routine/ lower managerial role, likely riding for work

**Prominent Persona – from Lewisham**

- In his early 20s, lives in post-war terraced house with his wife and two young children
- Low income family, he has few qualifications and works in a low-paid routine occupation
- Most commonly involved in collisions from 4-6pm on commute home from work

***It is very simplistic to believe that a campaign targeting motorcyclists would reach all riders. The in-depth studies showed very different personas of rider even in close geographical areas***

Motorcycling – a growing market in London

> ***For Lewisham, the target audience was a new young rider, aged between 18 and 25, riding on a provisional licence, having only taken a 'Compulsory Basic Training' (CBT) certificate to ride legally on the road***

So, in four London Boroughs, not so far apart from each other (no more than 11 miles), the only similarity is the size of the bike and the age of the rider. This confirmed that to deliver a targeted campaign, messages would need to be bespoke and tweaked to suit the local rider. The aim is for the messages to resonate with the persona of the rider we want to reach, meaning that one campaign would not necessarily target all of the riders most at risk. Indeed, although they ride the same bikes, that is all they share. We should never assume that the audience are the same purely because of a shared mode of transport.

But, how do we 'reach' our riders?

## TARGETED APPROACH

For Lewisham, the target audience was a new young rider, aged between 18 and 25, riding on a provisional licence, having only taken a 'Compulsory Basic Training' (CBT) certificate to ride legally on the road.

A CBT takes place over a one-day period, giving very little time to cover

important areas such as anticipation, hazard perception and knowing how to apply the rules of the Highway Code. So, using the data from the in-depth study, we produced a pre-CBT course.

As the riders in Lewisham were more likely to be commuters, it was important to offer something that would appeal to them, be worthwhile and incentivise them to take part. We looked at what could be offered to 'teach experience', encourage riders to learn the Highway Code, even when they are not necessarily required to, in order to pass a test.

How do we make it worth their while? A CBT costs in the region of £140 (€142), so an offer of a 50 percent discount on a CBT assessment day, to any rider that participates in a two-hour training session is of good value, and more than someone could earn in the time the course takes to travel to and attend.

The Lewisham CBT provider London Motorcycle Rider Training, (LMRT) offered a 50 percent discount on a CBT certificate for attending a two-hour presentation on their website, so we didn't advertise only to those that were already wanting to ride a bike and had contacted the local provider.

## COM-B Model

### Capability

The intervention will improve the participants' hazard perception skills

Will improve the riders' ability to learn from their own experience by developing their own self-evaluation skills.

### Opportunity

Provide the participants with coping strategies that will allow them to maintain control of their actions in difficult situations, for example, when in a social setting in relation to alcohol and drugs use.

### Motivation

The intervention will seek to motivate the participants to behave correctly by increasing the participants understanding of the benefits of the behaviours being advocated. Road safety interventions have often been criticised for their lack of follow-up after the initial intervention. The course will also include a follow-up e-learning module that reminds the participants of the key messages and will allow the participants to further improve their hazard perception self-evaluation skills.

Within the intervention the participants will also complete a self-affirmation exercise. This approach has been shown to increase the acceptance of key messages in a number of health behavioural related interventions.

## TOOLS TO MAKE YOUNG DRIVERS THINK – AND ACT SAFELY

We know that new riders are at a greater 'risk' due to their lack of experience. The intervention we offer aims to widen their experience and to develop the rider's own self-evaluation skills, while providing them with basic information relating to bike maintenance, protective personal equipment and a greater understanding of how alcohol and drugs can impair a rider's ability.

By giving a new rider tools to improve their ability to predict the likely actions of other roads users and to increase their ability to learn form their own riding experience, we give them the tools to self-reflect. The initial intervention was a classroom based two-hour session, using a number of behavioural change models, all of which can be incorporated within the three core elements of the COM-B model. (See box above)

In the first two years, over 250 riders attended the sessions, but we were losing participants due to the

***By giving a new rider tools to improve their ability to predict the likely actions of other roads users and to increase their ability to learn form their own riding experience, we give them the tools to self-reflect***

> ***Every employer engaged in the programme provides a point of contact within their company. They are responsible to cascade the information out to their employees/ colleagues. The employers tool kit comprises of posters, leaflets and up to date information***

times of the classes, their availability and their location. Thus, we developed an online module, where each element has to be finished before a fully completed course notification is given to the CBT provider, so participants cannot jump through it.

The online module offers young riders additional information to help them as they start their riding life.

## WHAT'S MORE?

In addition to the CBT intervention, Lewisham is a member of 2 Wheel London, a London Borough partnership working together to improve the information given to motorcyclists and help to offer safety messages to riders through their workplaces and on social media channels.

2 Wheel London is an employer led initiative offered to employers in membership boroughs as part of the programme riders who either ride to work or as part of their job, are provided with tips and advice throughout the year to help them stay safe. Each employer in the borough provides a point of contact for the all email information to be sent to, they then cascade the emails to riders in their company and a tool kit is offered with posters and up to date news to help raise an awareness of bikes to all road users.

Angry Al – the devil on your shoulder!


**FYI**

**Liz Brooker** is Road Safety and Sustainable Transport Manager for the London Borough of Lewisham

**liz.brooker@lewisham.gov.uk**

**Angry Al** is a new 2-wheel London social media campaign

**Twitter: @2WheelsLondon**

**Instagram: 2wlondon**

# Governance

The local and regional level is where disruptive change and transport innovation can flourish and are happening. However, this requires good regulatory approaches which make sure that the current paradigm shift does not undermine sustainable mobility policy goals. This section focuses on an evolving mobility landscape with increased involvement of private sector stakeholders and new public-private partnership

- C40 – Mayoral discussions on road pricing
- Rotterdam – Achieving a zero-emission logistics sector
- SUMPs – The EU SUMP Guidelines version 2.0
- Arlington, VA & Chicago, IL – A data-driven approach to managing shared mobility



# How road pricing can change your city

As the C40 group of mayors met in Copenhagen in early October, the Global New Mobility Coalition's steering committee wrote an open Letter to highlight the importance of road pricing in the actions that will help deliver on the Paris Agreement's commitments, driving towards meeting the goals of a prosperous carbon neutral economy and equitable society. Here is the text of that letter, presented by **Maya Ben Dror** and **Ivo Cré**

Current applications and research demonstrate that effective pricing policies can drive significant, positive impact in cities by reducing congestion, climate emissions and local air pollutants, and increasing the use of transit and active modes of transportation. Citizens and visitors breath cleaner air, don't lose time and experience an improved quality of life, and businesses enjoy higher revenues from having active mode lanes nearby.

The path for reversing a car-centric urban space is challenging yet rewarding. Fortunately, there are already many good examples out there including location-based approaches such as central district tolling (e.g. New York City), time- or demand-based models such as congestion charging (e.g. London, Singapore, Stockholm, Milan), and emissions based policies (e.g. London ULEZ).

Cities who have implemented road pricing schemes already have seen some great results.

- In London where the policy was implemented in 2003, traffic decreased by 15% and travel time decreased by 30 percent.
- In Singapore, the pioneer of congestion charging policy, travel times decreased because travel speed has increased from 30/35kph to 40/45kph since the 1980s, despite an increase in population. The policy ensures greater equity in mobility costs and travel time and increases economic productivity.
- In Stockholm, 197 new buses, 16 new bus routes, 2,800 new regional park-and-ride spaces and active mobility infrastructures were developed as part of the congestion pricing scheme. Coordinating these efforts maximizes long-term sustainability impact.

However, it is important to design road pricing policies carefully in order to enhance the environmental and societal benefits and take full advantage of emerging new mobility technologies. Road pricing policies in urban areas can take several forms and you can design the methods that best fit your city.

Below are five ways mayors can make sure their road pricing approach is most effective for their cities:

First, ensure the policy is serving the long-term vision for mobility, its design should reflect key mobility principles established by the city.
For example, the Shared Mobility Principles, adopted by cities and transport agencies around the world, includes prioritization of people over vehicles, the promotion of equity, and engagement with stakeholders.

Second, implement road pricing policies that establish a level playing field on which all vehicles are regulated.

To tackle environmental and societal issues stemming from mobility at their core, the cost of driving a vehicle ultimately needs to reflect its cost to our cities. By charging a fee for all vehicles (private motorists, delivery vehicles, taxis, and new mobility technology platforms), road pricing creates an incentive for everyone to share space more efficiently. Policies that exempt large numbers of vehicles incentivize more travel. For instance, schemes that target only certain mobility options or that exempt certain vehicles like taxi fleets or private car owners (as some cities have done) may incentivize more travel in higher emission, lower efficiency cars. Charging fair fees to all types of vehicles is critical.

Third, to the greatest extent possible road pricing schemes should reward higher-occupancy trips and lower emissions mobility.

When priced significantly lower than more polluting, single-occupant modes, road pricing policies can lead to the significant shift from private cars to more sustainable mobility. While typical road pricing policies can naturally encourage higher occupancy per car offering multiplied incentives to those modes that increase seat occupancy – especially technology enabled platforms that can pool parties – helps to spur market innovation for sustained, future higher occupancy mobility. On a passenger-mile basis, one person in a 50 miles-per gallon hybrid car can have the same emissions profile as two people in a 25 miles-per gallon car. Similarly, extending outsized incentives for ultra-low (e.g. high fuel economy hybrids) and zero tail-pipe emission (e.g. full battery electric or hydrogen fuel cell) vehicles rewards market innovations that drive sustainable mobility. Taken together, these shifts can increase the options for high efficiency modes on an emissions per passenger-mile/kilometer basis.

Fourth, funds collected through the policy should be channeled toward infrastructure improvements supporting high efficiency, shared and active modes of mobility.
These funds should support "first/last mile" services, shared

***When priced significantly lower than more polluting, single-occupant modes, road pricing policies can lead to the significant shift from private cars to more sustainable mobility***

***The opportunity to address road-transport hazardous emissions and incentive shared rides and multi modal mobility, can bring a city one step further towards an inclusive, equitable, and clean mobility for all***

active and micromobility (such as walking, bikes, scooters, and mopeds), urban fast-charging for shared use EVs, micro-transit including shuttles, and pooled on-demand services. First mile options play a critical role in commuters' ability to access transit and leave their cars at home, and should be diverse and cater for different needs. When appropriate, convenient and cost-effective access to micro-mobility and active mobility options should be enabled, and on-demand shuttles and pooled rides to and from key transit lines should be made feasible. Should commute modes have reasonable availability of fast charging at key locations, first and last mile commute can be zero tailpipe emissions. These require agile planning, in which private and public actors co-design a seamless system that can serve all commuters while delivering sustainable mobility in which people ate at the center instead of vehicles.

Fifth, any road pricing program should feature strategies to improve equity in transportation.

Transportation equity implies that all communities – including low-income, communities of color, immigrant communities, or individuals with disabilities – have adequate access to affordable transportation options and are not disproportionately affected by new transportation investments.

Transportation equity is an on-going problem, especially as the proximity of jobs to high-poverty communities has declined rapidly since 2000. Implemented correctly, a road pricing program can promote equity instead of serving as a regressive fee on the most vulnerable residents. To promote equitable outcomes the program should: (1) Engage community members, especially vulnerable populations, in the process of developing a road pricing program, (2) Offer affordable alternatives to the charging system for qualifying vulnerable populations, such as free or discounted transponders and caps, discounts or exemptions for tolls, and (3) Use program revenues to improve transit service and bicycle and pedestrian networks, prioritizing routes in marginalized communities.

The opportunity to address road-transport hazardous emissions and incentive shared rides and multi modal mobility, can bring a city one step further towards an inclusive, equitable, and clean mobility for all. We appreciate that Singapore, London, Stockholm and Milan have already adopted the policy, that NYC and state of Israel are drafting central district tolling policy, and cities such as Seattle and Los Angeles are considering adoption of new road pricing policies.

New technologies now allow cities to establish dynamic pricing schemes with variable fees much more easily that was true even a few years ago. As a global coalition comprised of researchers, new mobility providers and advocates, we wish to support the generation and exchange of information useful for maximizing the positive impacts of this valuable policy instrument. If designed right, road pricing can place your city on the path to clean and equitable human-centric mobility systems.

Sincerely yours,

**Adam Gromis, Global Sustainability Lead, Uber**
**Amitai Bin-Nun, PhD., Vice President, Autonomous Vehicles and Mobility Innovation at Securing America's Future Energy (SAFE)**
**Andrei Greenawalt, Head of Public Policy, Via**
**Prof. Austin Brown, Executive Director, Policy Institute for Energy, Environment and the Economy, UC Davis, UC Davis**
**Daizong Liu, China Sustainable Cities Program Director and China Transport Program Director, WRI**
**Karen Vancluysen, Secretary General, Polis – Cities and Regions for Transport Innovation**
**Lilly Shoup, AICP, Senior Director of Policy and Partnerships, Lyft**
**Maya Ben Dror, PhD., Future Mobility Projects Lead, World Economic Forum**
**Dr. Nicolò Daina, Department of Civil and Environmental Engineering, Imperial College London**
**Ori Yogev, Founder and Chairman, Future Mobility IL**
**Prof. Wolfgang Ketter, Chaired Professor of Information Systems at the Faculty of Management, Economics, and Social Sciences, and Director of the Institute of Energy Economics at the University of Cologne**

***On behalf of the World Economic Forum's Global New Mobility Coalition***


## A new way to manage the kerb space

- **servicing of inner cities is transformed**
- **reduced congestion**
- **improved air quality**
- **ev-zones**

This Intelligent Kerbside Management solution makes more effective use of the kerbside, helping speed up deliveries and in turn reducing congestion, emissions and improving air quality.

This product of Grid Smarter Cities is patent protected, with global potential.

---

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# The new mobility

**Maya Ben Dror** is the Future Mobility Projects Lead at World Economic Forum and one of the signatories of the Open Letter to C40 Mayors on Road Pricing. **Ivo Cré** Polis' Director of Policy and Projects and Coordinator of the Access pillar interviewed her to get the Global New Mobility Coalition's perspective on urban road user charges and their future.

GLOBAL NEW MOBILITY
COALITION

**What is the GNMC? Why is your organization, the WEF, piloting this?**
The World Economic Forum (WEF) is dedicated to improving the state of the world. Currently, emissions from mobility will double by 2050, and as passenger vehicles account for 70 percent of these mobility GHG emissions and cause over 50 percent of city air pollution, the Forum and a strong stakeholder group decided to address this imminent risk for the planet and well-being. The Global New Mobility Coalition is a platform that gathers over 100 members from the private, NGOs, research and fellow coalitions and alliances of cities, such as Polis and C40, geared towards building awareness and co-developing policies that could reduce the number of polluting cars on the road from the projected 2.1 billion to 0.5 billion by 2050. What's unique about the Coalition, is that it seeks to accelerate the shift from single occupancy internal combustion engine cars, which will continue to dominate the market beyond 2030 under business-as-usual or electrification of new cars scenario, to ride-sharing in zero-emission modes that will eventually be automated. Studies show that the transition to shared, electric and automated mobility (SEAM) is feasible while accounting for increasing mobility demand and economic growth. SEAM is an important aspect of our flight against climate

***What's unique about the Coalition is that it seeks to accelerate the shift from single occupancy internal combustion engine cars ... to ride-sharing in zero-emission modes that will eventually be automated***

change because most drivers today are unlikely to leave their car keys at home and move more sustainably without a compelling alternative, and that active, transit and micro modes of commute which should be at the core of sustainable mobility systems, aren't or cannot be adopted by all in the immediate and short term. Our vision is for a shared, high occupancy and right size, zero emissions, and eventually automated mobility systems in city centres, for achieving 95% reduction of passenger mobility emissions.

**The GNMC comes forward with a strong message about urban road user charges – a controversial topic. Why do you think this is the right time to address this issue?**

Although only adopted by a handful of cities to date, Mayors around the world have recently been contemplating with Road Pricing. And rightfully so; pricing is a basic governance lever that can help guide behavioural shift, attract required investments and justify novel business models, and roadways are a public good that needs to be carefully managed if intended to serve a desired quality of life for all citizens. Over the past two decades, various schools of thought illuminated the fact that significant externalists of mobility – degraded air quality, intensified climate change, growing socio-economic gaps – are not accounted for in current mobility costs. Road-pricing offers an opportunity to redesign cost structures based on negative impacts over various locations and periods of the day in an inclusive, balanced and holistic manner – if designed right. It can also generate new funding that should be channelled to sustainable and inclusive mobility system improvements, of particular value when considering the removal of revenue from on-street parking in favour of active mobility enhancement. Mayors and voters alike seem to be open to re-price commute options as we shape a sustainable and inclusive mobility future.

***Now that a great variety of alternatives have been introduced by new mobility solutions, such as floating two-wheelers and on-demand mobility services, mobility is gradually being perceived as a service and not a product***

**How do new mobility services relate to urban road user charges?**

New mobility solutions, from micro-mobility to autonomous vehicles, spurred public-private dialogue and a general public readiness, if not advocacy, for placing people and not cars – back in our city centres. Over 30 cities have already started acting upon that vision. However, the transition away from current car ownership isn't easy for everyone. Road-user charges have proven to do a great deal in nudging people out of their cars without slowing socio-economic development and while designing for equity. Furthermore, now that a great variety of alternatives have been introduced by new mobility solutions, such as floating two-wheelers and on-demand mobility services, mobility is gradually being perceived as a service and not a product. Therefore, a greater variety of mobility payments options and wider spectrum of costs, have too entered the ground for new mobility costs levers at the disposal of not only companies, but also of those governing our public goods. Last, new mobility and the information era more broadly have increased the accuracy and abundance of real-world data that can in turn be harvested to create dynamic pricing policies.

**What can we expect from the GNMC over the next months?**

The Global New Mobility Coalition is action-oriented. We'd like to move beyond awareness building and policy endorsement and support cities as they design agile road pricing. Road pricing policy requires a delicate context dependent and nuanced effort. We wish to bring our know-how from technology, business, academic and advocacy groups, as well as partner with local stakeholders, in support of bold policy development and implementation. GNMC is also developing its thinking around how to best design and implement other policies that can accelerate the transition to share, electric and automated mobility (SEAM) for achieving greater and faster emissions reduction and welcomes likeminded to join its effort. We will continue to advocate for a holistic adoption of new mobility options that will enable everyone to commute more sustainably, and advocate that do so, while improving their quality of life. Acknowledging the hard yet acute task of cities in delivering on their goals, we wish to advance our mutual goal collaboratively and curate multi-stakeholder dialogues.

**FYI**

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# Gaining purchase

**Giacomo Lozzi** and **Francesco Ripa** go behind the scenes of BuyZET, an EU project tasked with achieving zero-emission city logistics

iStock

Cycling along the wide paths bordering the clean streets of Rotterdam, Netherlands on an average day, one can feel the dynamism and the energy of the city that has started a new day. While life goes on as always, many things happen throughout the city that almost go unnoticed. An electrician has just stepped out of his van to get something fixed at a municipal building: it's his first task for the day. A team of construction workers is waiting for some material to be delivered on the site they've been working on for weeks. These and other activities have something in common: they all rely on some sort of transportation services. Their existence is crucial to the functioning of a city like Rotterdam.

Finding ways to make them happen with the least possible harm to the environment is a challenge. A challenge that the city decided to take on by exploiting the procurement leverage, with a little help from the European Union and a project called BuyZET.

At first, Rotterdam started to study in detail the myriad activities and movements that the sheer municipality's needs were producing. How many trucks


A charging station for freight electric vehicles in Oslo, Norway

and vans move around the city to fulfil our needs? What kind of goods and services do they provide? What's the $CO_2$ footprint of these transport services, and how can we use our influence as customers to reduce it?

They found out that over 95 percent of total emissions were due to the transportation of construction materials. In Rotterdam, just as in many other cities across Europe, roads need to be maintained and new schools need to be built. The city found that heavy-duty trucks travel around 300,000 km a year in the city to deliver construction materials – mostly sand – to these sites.

## THE LAST MILE

What could the city do to keep the construction sites running but polluting much less? Asking all truck operators to suddenly switch to electric is unrealistic. The development of zero-emission heavy-duty vehicles is not mature enough yet. So instead of setting strict requirements, Rotterdam decided to adopt a more open – or "promotional" – approach based on award criteria.

They decided to focus on the very last bit of the deliveries – the "last mile" connecting the industrial facility to the construction site. The minimum requirements, which apply to the vehicles used within the contract, impose the emission thresholds of the Rotterdam Low Emission Zone (LEZ), which will be transformed to a Zero Emission Zone by 2025.

The city designed award criteria requiring suppliers to put forward a vision for zero-emission transportation for each service contract. This approach was conceived to elicit interesting and innovative ideas from the operators of a highly challenging procurement category. Rotterdam successfully tested this approach in a tender for the supply of bricks in June 2018.

One of the things that the city learned during this experiment is that suppliers are very open to learn more about the existing possibilities for zero-emission

***How many trucks and vans move around the city to fulfil our needs? What kind of goods and services do they provide? What's the $CO_2$ footprint of these transport services, and how can we use our influence as customers to reduce it?***

vehicles. Another learning was that local authorities should carefully consider the barriers and costs that suppliers may face in adopting such vehicles.

## STAR ATTRACTION

The transportation of craftsmen and supplies in carrying out maintenance activities for buildings owned by the city (eg painting, cleaning, plumbing, etc.) was identified as having the second largest transportation emissions footprint within the city, following a procurement mapping exercise. For the procurement process for the renewal of a series of facilities maintenance contracts, a new approach was piloted in 2018, based on the ECOSTARS Fleet Certification Scheme. ECOSTARS, implemented by the city of Rotterdam, rates vehicles and operating practices using star rating criteria, to recognise levels of environmental and energy savings performance of logistics operators. The strategy involves an initial rating of the suppliers' fleet at the start of the contract period. To receive a contract extension the supplier must achieve a 5-star rating and buy at least one new electric vehicle by the end of the contract. The tender establishes minimum requirements that are realistic and do not need to be met immediately, but by the end of the contract.

***One of the things that the city learned during the experiment is that suppliers are very open to learn more about the existing possibilities for zero-emission vehicles***

**100% electric waste collection truck in Rotterdam**

### Six tips on different procurement approaches

1. Use award criteria and fleet certification schemes to give preference to zero-emission vehicles transportation
2. Establish minimum requirements that are realistic and can be met not immediately, but by the end of the contract
3. You can require deliveries to be made through a consolidation centre!
4. Require transport monitoring data to be collected and shared by suppliers
5. Increase contract length – to allow vehicle investments
6. Separate contracts into geographical lots to minimise trips across the city.

Rotterdam hopes that their experience can inspire other European cities to follow the same path towards more sustainable city logistics. The BuyZET project, which ended in 2019, produced a Handbook to make that easier. All the knowledge generated based on the experiences of Rotterdam, Oslo and Copenhagen was consolidated into a document – "Procuring zero emission delivery of goods and service" – that will help city authorities achieve zero-emission city logistics with public procurement.

The five steps presented in the Handbook can be applied in any city. As it happened in Rotterdam, the first challenge is to map the transportation emissions linked with the procurement of goods and services. This exercise allows cities to quantify the $CO_2$ emissions, understand the costs and benefits, and identify procurement areas based on a number of prioritization criteria.

Based on this analysis, the city has enough information to develop tender

Morris

**Almost every product or service we buy leads to vehicle trips within cities**

***The final challenge is to turn the findings from each of these steps into a concrete plan of action. In this plan, cities need to outline their procurement approach in each procurement category addressed***

## The BUYZET Handbook

Many municipalities across the EU are making significant efforts towards promoting zero- and low-emission mobility solutions in their own fleets and for the transportation services they procure. However, to date much less attention has been paid to the wider impact of the procurement of goods, works and services on urban traffic flows.

BuyZET stressed how public authorities can adjust their procurement of general goods and services to help promote sustainable urban transportation patterns. The project brought together a group of ambitious cities, led by Copenhagen, Oslo and Rotterdam, who wished to explore how they can promote the zero-emission urban delivery of goods and services through their procurement actions.

The BuyZET Handbook, available online, presents:

- A set of preliminary procurement recommendations for services, good and construction
- A description of the process followed in each city to identify procurement strategies

One of the primary conclusions from the project, however, is that there is no single approach which fits all cases, rather that it is imperative to discuss and develop your strategies together with actors throughout supply chains, in order to devise strategies which really can deliver in practice.

requirements that satisfy their policy-making needs. For those requirements to be also realistic for suppliers, though, a process of market engagement is essential. Engaging in a dialogue with private actors allows city authorities to gain a deeper understanding of the market and the potential pathways to zero-emission transportation. This is also a useful process for suppliers, to get a better insight into the policy plans and tender requirements plans for the specific cities, as well as developing their own understanding of zero emission delivery opportunities.

The cities have also investigated the potential and feasibility of buyers' groups within some priority sectors to foster the demand for innovative transport solutions. Through the buyers' group, cities aim to attract other public authorities potentially interested in enhancing their public procurement skills for sustainable transport solutions, as well as private buyers and other large attractors such as universities, hospitals, etc. . In some cases, buyers' groups have also the potential to generate enough purchasing power for the uptake of innovative solutions by the private market.

The final challenge is to turn the findings from each of these steps into a concrete plan of action. In this plan, cities need to outline their procurement approach in each procurement category addressed. Within the project, these action plans were called "Innovative Procurement Plans".

To conclude, the experience of Rotterdam, Oslo, and Copenhagen shows that it is possible to leverage a city's role as a customer to make city logistics more sustainable.

**FYI**

**Giacomo Lozzi** is Project Manager and Coordinator Urban Freight at Polis network

**Francesco Ripa** is Communications Manager at Polis network

# Develop, implement, change

The second edition of the EU SUMP Guidelines sets new standards for innovative sustainable urban mobility planning, supporting cities and regions to initiate positive change for the future, as **Lisa Marie Brunner** and **Lasse Brand** elucidate


Every Friday, young people are taking to the streets demanding urgent action from decision-makers to tackle the climate crisis and safeguard their futures. In these times of protests and global climate agreements, practitioners and politicians need support and guidance to deliver the change needed.

Indeed, European cities that want to become more liveable for their inhabitants, that want to achieve a mobility shift, and that want to prosper whilst reducing CO2 emissions and improving air quality, cannot address the challenges associated with today's complex transport systems alone.

That is why the arrival of the second edition of the Guidelines for Developing and Implementing a Sustainable Urban Mobility Plan (SUMP) is of immense importance. Released on 2 October 2019 at the CIVITAS Forum 2019 in Graz, Austria, they support planners and policy makers to create their own SUMPs.

In this way, they can integrate sustainable mobility into their visions for liveable cities – suitable for current and future generations. Sustainable urban mobility planning sets new standards for more innovative and inclusive transport planning, and helps cities and regions to integrate all transport modes and encourage a shift towards more sustainable mobility.

SUMPs contribute to realising key European mobility goals, such as

> ***"A SUMP is a very new and innovative tool we've had in place since 2013 to help the cities and regions of Europe to incorporate sustainable mobility principles into their day-to-day planning activities."***
>
> *Matthew Baldwin, Deputy Director-General, DG MOVE, European Commission*

better air quality, improved accessibility and mobility, increased road safety, decreased traffic noise, higher energy efficiency, and enhanced quality of life. A state-of-the-art SUMP is increasingly seen as a must-have for aspirational cities.

## WHY DID THE SUMP GUIDELINES REQUIRE AN UPDATE?

Since the release of the first edition in 2013, SUMPs have become an indisputable success story – there are now over 1,000 plans in Europe. Yet this vast amount of activity means that a wealth of SUMP implementation experience has accumulated; something that needs to be incorporated into guidance on the subject.

At the same time, much has changed in the world of transport. Rapid digitalisation, the spread of smartphones and high-speed internet, an explosion of internet shopping and parcel delivery, and the rise of micromobility are only some of the developments that have serious implications for urban mobility planning.

Mobility habits and awareness are also undergoing a change – with a shift from owning to sharing, increased active mobility, and a greater understanding of the relationship between public health and transport.

Irrespective of whether people agree on the aforementioned factors being those that will fundamentally change the "urban mobility game", it is clear that a strategic document such as a SUMP has to consider and reflect new realities.

Finally, all of this is set against the backdrop of increased societal awareness of the environmental emergency confronting the world, and transport's central role in causing and overcoming it.

## THE SUMP 2.0 PROCESS

The process to update the SUMP Guidelines – called SUMP 2.0 – started in 2018. The document produced was the result of an extraordinary co-creation process. Over the course of 18 months, more than 300 people from Europe's SUMP community contributed their expertise.

### Unveiling the new SUMP Guidelines

The first copies of the document were presented to Matthew Baldwin, Deputy Director-General of DG MOVE, European Commission, Siegfried Nagl, Mayor of Graz, and Siegfried Rupprecht, Executive Director, Rupprecht Consult (the main authors of the Guidelines).

The members of the CIVITAS Political Advisory Committee (PAC) and CIVITAS Forum network also welcomed this milestone release with an endorsement. This was signed by numerous politicians in the PAC.

**Handover of the SUMP Guidelines. L-R: Siegfried Nagl, Matthew Baldwin, Siegfried Rupprecht.**

A special Editorial Board was engaged to steer this vast undertaking. This included members from the European Commission's DG MOVE, DG REGIO and INEA, the CIVITAS SUMP projects, Eltis, JASPERS, and leading mobility researchers. In this way, the document draws on immense European knowledge in the field. The project CIVITAS SUMPs-Up coordinated the authorial process.

The document has been developed and validated in close cooperation with the SUMP community. Starting with a large survey and dedicated session at the SUMP Conference 2018, a number of workshops, focus groups and conference sessions with practitioners and other experts from all over Europe have taken place. Involving several major city networks in the update ensured that feedback from cities and regions of all types was included.

## THE NEW SUMP GUIDELINES

The work of 100 authors and contributing authors is contained within the Guidelines. Its 166 pages guide practitioners and decision makers through how to develop and implement a SUMP using a step by step approach. This is complemented by a range of recommendations regarding tools, methods and good practice examples from cities all over Europe.

Whilst the SUMP concept and its eight fundamental principles have stayed the same, the recommended process for achieving them has been updated and improved.

The new Guidelines offer clear systematic advice, but highlight the flexibility of the process and the importance of adaptation to the local and national context.

They provide more support for important horizontal aspects, such as citizen engagement, political decision making and monitoring. To make the document as hands-on and practically useful as possible, good practice examples and planning tools are heavily featured in the update.

***"Flexibility is one the biggest strengths of the concept. Whilst the eight SUMP principles stand firmly, the process for applying them offers great flexibility. We know that every city is different."***

*Lasse Brand, Rupprecht Consult*

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**Figure 2: CIVITAS Politicians Forum**

More than 60 examples from cities all over Europe give inspiration on what SUMPs can look like in practice. Although the document was primarily developed with planners and decision makers in mind, it also contains a comprehensive introduction to sustainable urban mobility planning for those with less knowledge of the topic, including an updated description of its benefits.

## THE SUMP CYCLE

The new SUMP Cycle presents a balanced SUMP process, consisting of four phases. Each of these contains three steps, and starts and ends with a milestone. The strategic planning stage (phase 1 and 2) and the operational stage (phase 3 and 4) are clearly separated, as they often have different time logics.

The new version also contains more detailed guidance on the operational phases, specifically on how to select measures; to finance and plan them; and to implement them successfully. Whilst the cycle provides helpful systematic guidance with clearly ordered steps and activities, every SUMP will of course be different. In fact, the order of steps usually varies from city to city.

## SUMP IS GOING GLOBAL

The aim of the Guidelines is to offer wide and strong support for cities that wish to develop and implement a SUMP. Planners and decision makers from European cities are the major target group of the Guidelines, but SUMPs are also spreading beyond Europe.

For example, the MobiliseYourCity Partnership shows how the concept – with its inherent flexibility – is being


taken up in South America, Africa and Asia. To support this trend and reach even more cities, in particular more non-English speakers, the SUMP Guidelines will be translated into numerous languages.

The new SUMP Guidelines are a tool to initiate and manage change for cities. The manner in which they can be adapted to the specific circumstances of individual cities and countries means they are perfectly suited to the fast changing and increasingly complex world of mobility planning, regardless of location.

## FURTHER GUIDANCE

Together with the main document, 17 complementary topic guides and practitioner briefings have also been released, with more to follow in the coming year. They offer additional guidance on difficult aspects of the planning process, important policy fields, and for specific types of cities.

In addition, an updated version of the SUMP Self-Assessment online tool will be released soon. This will help cities identify the strengths and weaknesses of their planning approach and provide them with tailored advice for further improvement based on the new Guidelines.

> ***"The new thematic guides complement the main Guidelines. They are all based on the eight SUMP principles, but offer more in-depth recommendations on specific topics."***
>
> *Siegfried Rupprecht*

**FYI**
**Lisa Marie Brunner** and **Lasse Brand** are Urban Mobility Consultants at Rupprecht Consult

The SUMP Guidelines and all of the topic guides and practitioner briefings can be downloaded on the Eltis Platform:
**https://www.eltis.org/mobility-plans/sump-guidelines**

# Improving urban mobility ... one scooter at a time

## A data-driven approach to managing shared mobility

As shared transportation services expand across the globe, the shared mobility landscape has continued to grow — with more devices, more riders, and more trips every day. As **Diego Canales** reports, two American jurisdictions are using shared mobility data from e-scooters to make informed decisions on how to re-allocate public space and manage multiple private operators in the public right of way

Cities around the world have experienced the rapid introduction and expansion of new, shared mobility services – carsharing, bike-sharing and now scooter-sharing. The data generated by these new mobility services can help cities better monitor and manage new mobility pilots, but the volume of data can also be a challenge to analyse, particularly from a large number of operators.

Building on decades of experience developing software and analysis solutions for public agencies, Populus introduced its Mobility Manager platform early last year to help cities securely and effectively manage mobility data from multiple operators and multiple modes, including shared scooters, bikes, and cars. Their advanced analytics platform helps city transportation planners get the information they need by ingesting real-time and historical data from fleet operators. In these two case studies, we highlight our work with two American jurisdictions (Arlington County, Virginia and Chicago, Illinois) to help public agency staff assess data from mobility operators and evaluate their e-scooter pilot programs.

### MANAGING E-SCOOTER PARKING IN ARLINGTON COUNTY, VIRGINIA

Arlington, Virginia, a county of over 200,000 residents across the river from Washington, DC, launched an e-scooter and e-bike pilot program in October 2018. Each operator was allowed a fleet size of 350 vehicles, with the opportunity to increase its fleet if utilization was high (at least three trips per device per day over a full month).

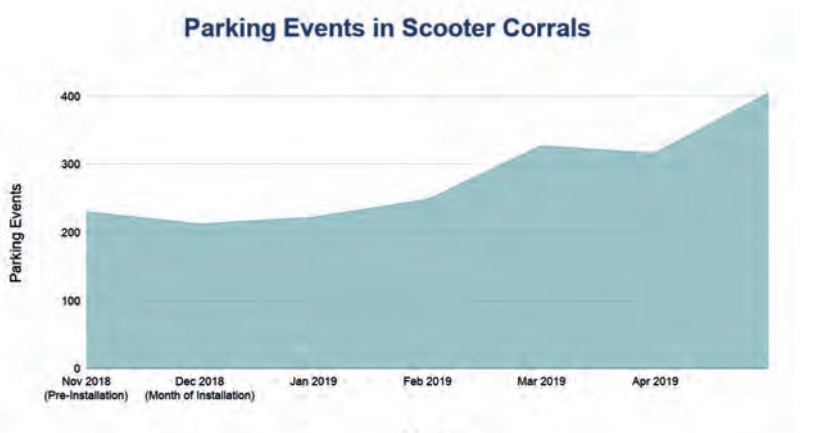
After launching, the quick adoption rate of e-scooters in Arlington led to growing questions about how new mobility devices should operate in the public right-of-way: where were the best locations to pick up or drop off scooters, and where should scooters not be placed due to local business concerns or other factors? Each operator was required to park its scooters in a manner that did not impede pedestrian access or obstruct access to the public right of way, and County staff wanted to promote good parking behaviour.

To incentivize parking in areas that did not obstruct the public right of way and were also popular for riders, staff needed to understand patterns of scooter usage and make data-driven decisions on where to install on-street scooter parking corrals.


**Populus Mobility Manager analyses millions of parking events to help cities identify and monitor parking for new modes**

## PARKING DATA ANALYSIS

Utilizing data from Mobility Data Specification (MDS) feeds, which provide information about vehicle status as well as trip data, staff analysed heatmaps of recent scooter parking events. Based on this heatmap analysis, they created geofenced areas as potential parking zones to monitor, as well as restricted parking areas around landmarks like the Pentagon. MDS data allowed staff to review both current and historical trip data and highlight which zones were most popular for scooter parking.




**Parking Events in Arlington's Scooter Corrals**

## PARKING CORRAL INSTALLATION

Based on the parking count information captured in the monitoring zones, staff determined priority sites for scooter parking corrals based on areas where riders were already parking large numbers of vehicles. In December 2018, staff identified on-street parking opportunities for seven new scooter corrals near six Metrorail stations. The city also worked with scooter operators to promote the corrals in their apps, so riders would know where to park their vehicles. In the months after installation, the corrals saw steadily increasing parking usage, demonstrating the density of usage nearby as well as the success of allocating space in the public right of way based on data.

After seeing over 300,000 trips on scooters during the pilot, the county voted unanimously to extend the program through the end of 2019, and installed additional corrals in June, July and September of 2019. In a recently released report, Arlington County evaluated their shared mobility device (SMD) pilot and found a firmly positive response from riders as well as increased deployment and utilization of SMDs.

## MANAGING AN E-SCOOTER PILOT WITH MULTIPLE OPERATORS IN CHICAGO

The City of Chicago launched their e-scooter pilot program in June 2019 with 10 different companies and 2,500 total scooters in a pilot geographic area


Scooter Corral in Arlington, VA

> ***Chicago's ambitious approach to bringing inca large number of micromobility companies presented some interesting challenges, including the need to access complex data streams from multiple operators***

on the city's west side. Chicago's rules for scooter operators during the pilot included operating times (5am-10pm), geofenced operating areas, and GPS data sharing requirements. Using the Populus platform, the city has found a way to manage the program with more visibility, as well as to easily harness data for future transportation policy and planning.

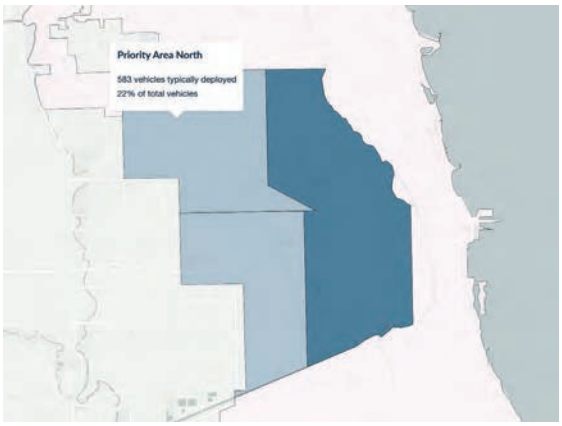
Chicago's ambitious approach to bringing in a large number of micromobility companies presented some interesting challenges, including the need to access complex data streams from multiple operators with different levels of data-sharing compliance. Populus worked closely with the city and each operator to ensure that all required data feeds were compliant, validated, and usable. City staff can now easily access data from all 10 operators in one dashboard, with views on available vehicles, deployments in prioritized equity zones, and trips taken in the pilot area.

## REAL-TIME LOCATION DATA

Chicago city staff can quickly see scooters inside or outside the pilot program area in real-time. Live location data via the General Bikeshare Feed Specification (GBFS) data feed helps field staff perform physical spot checks to find scooters outside the boundaries and notify operators who are out of compliance.

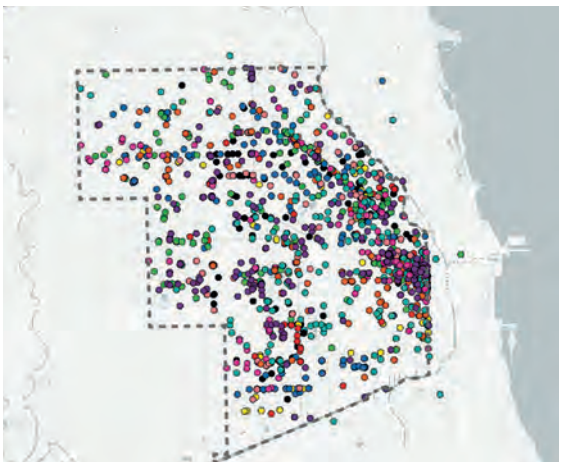
## ADVANCING TRANSPORTATION EQUITY

To ensure residents have equitable access to scooters across the pilot area, Chicago requires operators to deploy 50 percent of its total fleet in two priority areas. Using the Equity map, staff can view vehicle availability in the priority zones over time and by operator. Staff can also track operator adherence to the city's overall vehicle cap (250 maximum per operator). Historical data for the entire fleet is available, as well as data for each scooter operator.




**The Populus Equity Map helps staff measure vehicle distribution throughout the pilot area**


**Visualization of trip volumes in Chicago, IL**



**Populus live map visualizes available vehicles from all scooter companies**

## VISUALIZING HIGH-VOLUME ROUTES

Transportation infrastructure decisions can be complex and challenging. By visualizing data on where the highest number and volume of trips are taking place on their city streets, staff can use a data-driven approach when determining where to prioritize multimodal infrastructure like new bicycle lanes or crosswalks.

Without data, it's impossible for cities to measure progress towards their transportation goals. By requiring access to data feeds from shared mobility services, public agencies can learn how, where and when people are moving through the city, and are better equipped to develop informed policies and transportation plans. Populus provides tools to help improve coordination and communication between shared mobility operators and cities, helping deliver safe, equitable and sustainable streets for the future of mobility.

**FYI**
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