



The new e-scooter generation

How cities and operators are working together for increased safety

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Between 2009 and 2014, Sam Morrissey was manager of parking and traffic at the City of Santa Monica. He saw firsthand the arrival of shared ride services like Uber and Lyft and a number of applications from innovative transit and mobility providers. These varied from small electrified vehicles and different types of bicycles to zero-emission golf carts.

He believed that rules and regulations around companies charging fees to use a device to provide the public with some type of mobility needed to be examined.

“At the time I would jokingly say there’s going to be electric skateboards or jetpacks,” he says. “I couldn’t predict what it would be but I could just sense something was going to arrive.”

As he foresaw, it was only three years later in 2017, that Santa Monica became the epicentre of the e-scooter revolution. Hundreds of scooters were dropped overnight and since then Santa Monica has been known as the first e-scooter city. By 2019 e-scooters had spread across the country to reach 110 US cities.

A highly concentrated urban community within greater Los Angeles, Santa Monica’s location next to the beach meant it had always been a tourist hotspot with large numbers of pedestrians particularly along the beach bike path. It would be the first city to see close up the interaction between pedestrians and e-scooters.

“For years, even in my time in Santa Monica, we struggled with managing that area [the beach bike path] safely because it was highly congested and people would ride bikes or e-bikes through there very quickly,” says Morrissey, who is now Executive Director of Urban Movement Labs.

Morrissey believes e-scooter riders were pushed onto the sidewalk as those riding the new form of mobility didn’t necessarily feel safe along the city streets. This wasn’t helped by the fact, he argues, that in most places the sidewalks are too narrow to accommodate the volume of traffic.

“I grew up in New York City and every New Yorker hates non-New Yorkers walking on the sidewalk because they are slow,” he says. “It was a little bit of the same perception with scooters. But once



you get comfortable with people using scooters in a safe manner on a sidewalk, people become more accustomed.”

It wasn’t just the irresponsible riders whizzing by on the sidewalk that provoked reactions. Street corners and sidewalks became parking lots for hundreds of scooters, often tipped over, blocking the right of way.

“A lot of business owners were upset and they vocalised that to the political leaders and so very quickly many people saw them as a nuisance,” he says.



**Sam
Morrissey**

Executive Director
of Urban Movement
Labs



Lisbon: a model of collaboration

In Lisbon, the city was able to welcome scooters from a place of cooperation and partnership. Officials believed that public transport needed flexibility to take residents out of the car and e-scooters could help them achieve this.

Vasco Móra, who was an adviser to the Deputy Mayor for Mobility of Lisbon from 2017 until October 2021, agrees e-scooter's operations initially caused some complaints, mainly regarding parking conditions, but believes the level of scrutiny given to them was unfair compared to other transport modes, as poorly parked cars didn't receive as much attention while causing higher constraints.

"People were not used to them and complaints came in about them being parked on the pavement," he says. "What was curious was that in the background of the photos posted in social media were cars also parked on the pavement, clearly blocking the passage, but only one person complained about that."

The city organised public parking spaces for e-scooters and drove the message through social media campaigns to stop them cluttering the sidewalk. Geofencing is used but only for "no parking" areas.

Over time, with both the collaboration of the providers but also with the work of the enforcement teams, the complaints stopped and Móra says none were received in the first nine months of 2021.

"Safety around e-scooters is obviously a concern, but we are more concerned about reducing accidents with cars and pedestrians or cars with cyclists as those unfortunately have more severe consequences," he says.

Lisbon was inspired by Los Angeles to become the first city in Europe to adopt the Mobility Data Specification (MDS), which provides a template for data sharing for providers of dockless bike-shares, e-scooters and shared-ride providers that work within the public right of way.

LISBON



Vasco Móra

Adviser to the Mobility and Safety Deputy Mayor of Lisbon, 2017 to October 2021

After its launch in Los Angeles in September 2018, the then Deputy Mayor, Miguel Gaspar, saw its potential benefits and has adapted it to his city's needs from which it collects data every 15 minutes. The geographical analysis provides them a picture of where scooters are parked and if an enforcement team needs to go to pick them up.

"Now all the e-scooter operators share their data with us and this improves decision-making," says Gaspar, who left office in October 2021. "We've also started having conversations with Los Angeles and are sharing what we've learnt from our experience to improve it further. I think cities need to get together in global networks to deal with global challenges."

He says that first and foremost, the city is very open to innovation but with two red lines—public safety and the quality of public space. Secondly, it views new things through the lens of soft and hard regulation because as a city it also needs to learn how to regulate.

Gaspar says that this engenders trust with private sector operators who understand they need to engage the city in a dialogue where both need to converge on their positions.

He and his team would meet with representatives from the micro-mobility sector every two weeks, where they would discuss their concerns and work on fine-tuning the rules, when necessary.

"I think both sides put in their best efforts to make it work, and I think this kind of regulatory environment has helped make Lisbon an interesting location to deploy these kinds of services," adds Gaspar. "Sometimes we make decisions they don't like, but they understand why we have to take them. If we understand where they're coming from, we can try to position things in a way that achieves the same results but without harming the operational business model that they have."

The importance of good infrastructure

Newspaper headlines highlighting drunken riders terrorising pedestrians, scooters dumped on beaches and sidewalks and in very rare cases, deaths from riding, set the foundation for the perception of scooters to be deemed unsafe. Instantly the concept of e-scooters was tainted and they were portrayed as annoying and dangerous for riders and pedestrians.

Tim Papandreou, Founder of Emerging Transport Advisors and former Chief Innovation Officer at the San Francisco Municipal Transportation Agency, believes there was too much emphasis on the cluttering of devices on sidewalks and points to the fact that cities have failed to provide the necessary safe infrastructure.

“From a space efficiency perspective, scooters are an incredible and valuable tool,” he says. “One person on a scooter can fit in less than half a square metre of space in the street. It’s quiet, it’s electric, and it’s cheap to scale the fleet. They are 1/25th the footprint of a car.”

He says that without the proper city infrastructure of pick up and drop off demarcations and without bike lanes or slow lanes for scooters people will respond to a high traffic environment by riding the sidewalks.

“The power of infrastructure, good engineering and ensuring safety is much stronger than enforcement, education and even vehicle design.”

Juan Matute

Deputy Director, UCLA Institute of Transportation Studies



Tim Papandreou

Founder of Emerging Transport Advisors and former Chief Innovation Officer at the San Francisco Municipal Transportation Agency



Juan Matute

Deputy Director,
UCLA Institute of
Transportation
Studies

Juan Matute, Deputy Director, UCLA Institute of Transportation Studies, says as a transport planner the right infrastructure is critical.

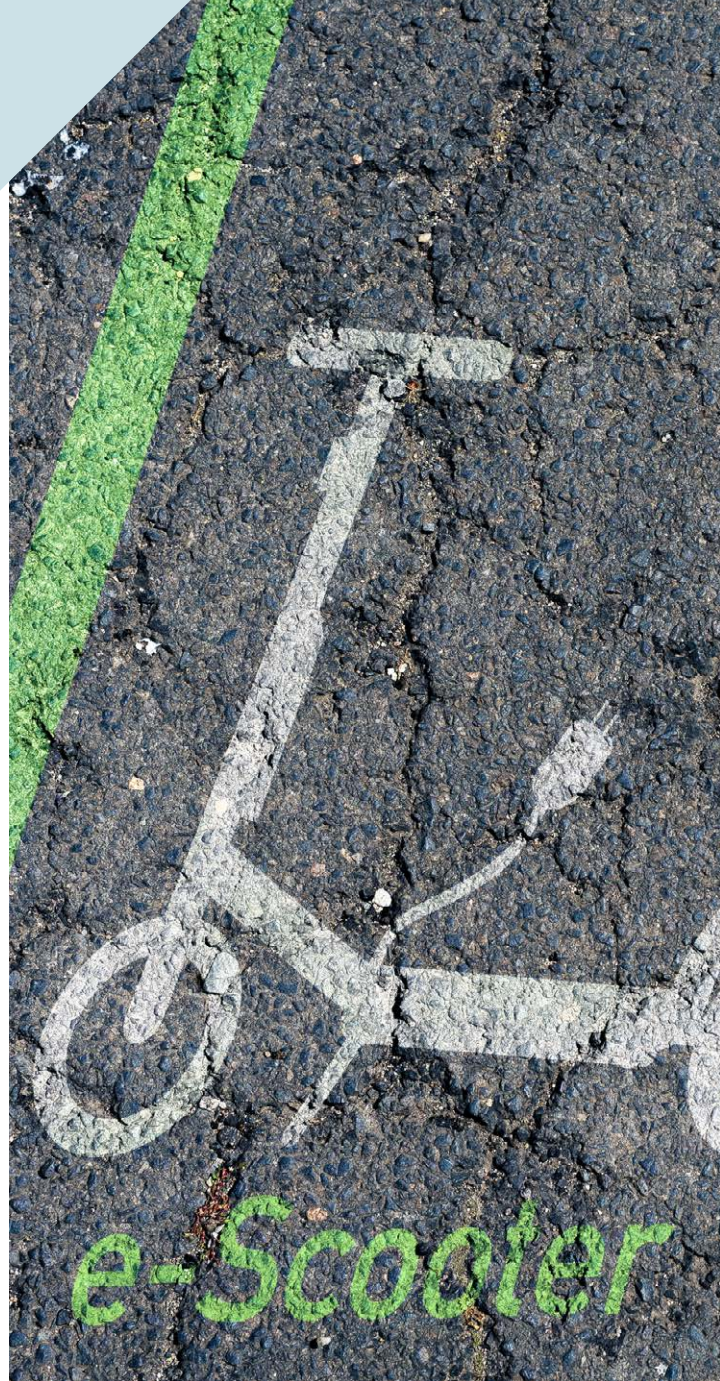
“The power of infrastructure and good engineering and ensuring safety is much stronger than enforcement, education and even vehicle design,” he says. “But how do you get to where a municipality is willing to make investments in space and money?”

Morrissey agrees and highlights a push in recent years towards complete streets where in particularly dense urban areas vehicle traffic should be driven slower and the maximum person throughput should be maximised rather than the vehicle throughput.

“That means having lanes for buses, lanes for scooters and getting more people in total, not just people in vehicles,” he says. “Cities have to be more thoughtful about how they provide that space but it’s also very challenging politically because there is pressure from automobile drivers on the needs of traffic that it becomes difficult for politicians to support.”

The pandemic caused many cities to rethink their street space. Morrissey believes that small actions, like simply closing off a street, to allow slower moving transit options like cycling and e-scooters doesn’t cost cities a lot of money yet are effective.

“Providing those facilities becomes a lot less expensive,” he explains. “You’re not talking about building bike lanes, just closing off streets and I hope those real awesome benefits can be picked up and run with.”



Papandreou agrees and says that because of the pandemic traffic volumes became lighter, and space allocation for cars became less of an issue.

“Governments were more open to try things like slow streets and turned street parking into alfresco dining areas that has allowed scooters to be seen as an essential piece of the transport puzzle,” he adds.



Stockholm: putting a price on operators

Stockholm took a welcoming approach to operators when they arrived in the city over two years ago. Voluntary agreements between the city and operators specify geofencing in certain areas, and speed reductions on various streets.

Mathias Lundberg, Head of Department for Transport Planning, City of Stockholm says it has worked quite well as operators nowadays want to have a good reputation.

Although statistics are not available on pedestrian accidents, he believes it is quite rare compared to e-scooter riders injuring themselves. Interestingly he notes that riding on the sidewalk is rare in Stockholm as most prefer to ride unimpeded and faster along the streets and roads.

Poorly parked e-scooters remain the biggest irritant for the public. Lundberg believes this will change over time as people's behaviour changes.

"It's a deep learning process as people are not used to them," he says. "Too many people park them badly but you don't see people parking their bicycles badly so it could be a question of time, maybe in a couple of years, people will gradually behave better."

STOCKHOLM



Penalties also play a part. If the city has to move scooters a short distance to the proper parking area (10 to 20 metres) the operator is fined €25 and if they have to be moved to a depot outside of the city the operator receives a €50 fine.

Lundberg says that to get people to change their behaviour they might need a nudge from the authorities and he hints at possible speed reductions at the weekend and in the evenings that might be implemented.

From the beginning of January operators might have to pay a yearly fee of 1,400 Swedish kroner (US\$158) for each scooter but the final decision has yet to be taken by the city.

“That hopefully gives the operators an incentive not to put too many scooters out onto the streets but then we, the city, can use some of that revenue to improve conditions,” he says.

Stockholm has also introduced a shared parking



Mathias Lundberg

Head of Department for Transport Planning, City of Stockholm

stand for scooters, almost like a bike stand to encourage people to drop off scooters and not leave them all over the sidewalk.

“The benefits of e-scooters, to me, still outweigh the disadvantages,” says Lundberg. “They give the city more mobility options and we still remain supportive.”

From the beginning of January operators might have to pay a yearly fee of 1,400 Swedish kroner (US\$158) for each scooter but the final decision has yet to be taken by the city.

Cities need more data to act on safety

In the US, the Insurance Institute for Highway Safety (IIHS) undertook a study in 2019 that found most e-scooter rider injuries happen on the sidewalk. The institute's researchers interviewed more than 100 e-scooter riders whose injuries brought them to the emergency room at George Washington University Hospital in Washington DC, between March and November 2019.

Despite the prevalence of sidewalk riding, only six pedestrians came to the emergency room with injuries caused by e-scooters during the study period. Four of them were pedestrians or cyclists who fell tripping over or trying to avoid an e-scooter that wasn't in use.

"We're also seeing a lot of the people who are injured are pretty inexperienced," explains Jessica Cicchino, IIHS vice president for research and the lead author of the studies. "About one-third of the people who were injured were on their very first ride, which is similar to what other people have found in other cities."

Washington DC's regulations for e-scooters include a top speed of only 10 miles an hour, one of the lowest of any city. The report noted that injury rates could vary widely in other cities with a higher top speed.

Cicchino adds that in the study group not many riders were getting hit by cars, which is far higher when she compared injuries to cyclists, but that most e-scooter injuries were associated with uneven pavements.

"It makes us wonder if these injury rates will go down as people get used to riding them," she adds. "We're still seeing a lot of new [e-scooter schemes] and so we expect a lot of new users who have no knowledge base of how to operate them when they step on them for the first time."

In the UK, e-scooter injuries are largely unreported as private ownership is still illegal, although rarely enforced. More than 40 legal pilots with shared scooter operators began being trialled in cities and towns across the country



Jessica Cicchino

Vice President for Research, Insurance Institute for Highway Safety

in July 2020. The findings from these pilots will then be implemented to update the national law.

Currently there is no category for the police to indicate e-scooter incidents when reporting road collisions involving injuries and hospitals have no pre-agreed method for collating details.

The first national data on injuries involving e-scooter collisions (rental and private) was published in September 2021 by the Department for Transport. Adjustments were made to account for police injury-based reporting, of which 484 injuries were recorded in incidents involving e-scooters in 2020. Of these, 100 were non e-scooter uses—namely pedestrians.

Due to the lack of data, the Parliamentary Advisory Council for Transport Safety combed through media reports, and recorded over 100 e-scooter injuries in the UK during the first ten months of 2021.

Twenty percent were riders involved in single vehicle incidents having lost control of the device therefore falling or striking an object but only 10 percent were other vulnerable road users—mainly pedestrians.

New Department for Transport (DfT) figures released in November 2021 identify that more than 130 pedestrians have been injured in the past year out of a total of 931 accidents reported. However, the statistic does not distinguish between privately owned scooters and those operating in the legal pilots.

A DfT spokesperson notes: “Safety will always be our top priority and the trials currently taking place in 32 regions across England are helping us to better understand the benefits of e-scooters and their impact on public space. No fatalities have been reported to the department by trial areas and trial e-scooters are limited to 15.5mph with compulsory safety features such as horns and bells.”

Adding pressure to transit officials is that in the US and Europe many are charged with the implementation of a “vision zero” goal to eliminate traffic deaths and fatalities. Cities are also legally obligated to provide safe transport modes.

“Safety is top of mind for decision makers and especially when they are thinking about e-scooters because they don’t want to create this new mobility ecosystem that is further eroding the pursuit of Vision Zero goals,” says Matute.

He adds the media will always be more attracted, and hence add pressure to city decision makers, if a “tech bro” is drunkenly riding a scooter at two o’clock in the morning compared to an old man crashing his car after drinking on a Sunday afternoon.

Morrissey says this does not help scooters overcome an unsafe perception.

“Unfortunately, in the United States we’ve come to live with the fact that 40,000 people are going to die from automobile collisions,” he says. “The rate of fatal collisions on scooters is far far lower.”

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Houston favours bikes over scooters

The car capital of the US, Houston, outlawed scooters from the outset but interestingly not to the advantage of cars but to promote further its successful bike-share scheme.

E-scooter operators are only allowed to operate out of a storefront and cannot set up docks or leave scooters in any right of way areas but must have a “home base”. No mobility operator is allowed to operate in the city’s right of way without authorisation.

“Nothing is allowed on our sidewalk in our business district except pedestrians,” says David Fields, Chief Transportation Planner at the City of Houston. “That is definitely from a safety point of view and we are working hard to build out our bike network.”

He adds that many residents were “turned off” by what happened when e-scooters rolled out in neighbouring Dallas.

“Scooters were just everywhere and blocking the pedestrian realm,” he says. “They ended up in front lawns, in lakes and a lot of people in Houston heard about this. It was really the worst kind of messaging that micromobility could ask for.”

Houston’s BCycle bike share scheme has received a lot of support from the community and advocates. In 2020, BCycle saw an increase of 50,000 rides over the previous year and it reached its one millionth rider six months earlier than expected.

The company says numbers are continuing to increase, and BCycle is on track to see another

HOUSTON



60,000 more rides this year with the addition of electric bikes.

Although e-scooter operators have approached Fields, he says he is yet to see the value of e-scooters and only sees the downside from other cities' experiences.

BCycle says numbers are continuing to increase, and they are on track to see another 60,000 more rides this year with the addition of 100 electric bikes.

Fields emphasises that the city is also moving away from its historical focus on the car by building out more than 1,800 miles of bike network.

"We already have 350 miles which is more than other cities have in their end game," he says. "There is certainly appetite for bikes and I can't make that equation to scooters. We're not against the idea if there is community interest for scooters to spend resources on it but there hasn't been to date."

Fields says that poor messaging from the beginning of e-scooters still taints many people's perception of their



David Fields

Chief Transportation Planner at the City of Houston

safety and how they operate. Changes in the market from growth to consolidation also do not help.

"We've looked around at these operators and they come and go so quickly," he says. "It means a lot of work by city staff on contacting and figuring out who is the new operator. When the industry is a little more solid and we know who we are going to deal with that might encourage more conversation."

Many residents were "turned off" by what happened when e-scooters rolled out in neighbouring Dallas.

Why legitimacy is important

Gone are the days of when operators dumped scooters into a city overnight and watched an uncontrolled experiment unfold.

“It was a growth-focused approach,” explains Matute. “The operators wanted numbers through short-term growth. Government partnerships or relations took a back seat. If operators did, it was merely a mitigation exercise.”

Cities eventually caught up with the operators by limiting their use, issuing permits and pilots, through RFPs, and rudimentary geofenced parking. This caused many companies to differentiate their product, of which increased safety became a new unique selling point.

Politically it was also important for scooters to be regularised or normalised thereby taking away the possibility of people painting them as something unsafe.

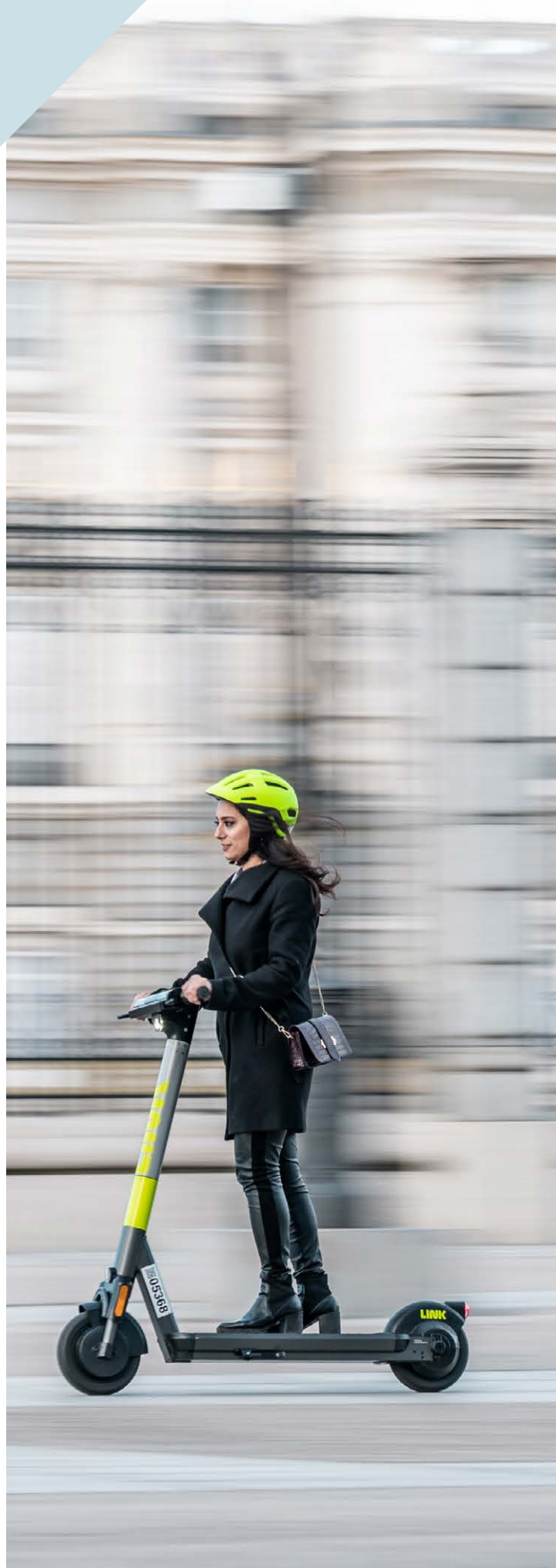
“Previously the concerns governments were expressing didn’t necessarily make it to the product development cycle early on,” adds Matute. “Now, some companies are valuing that input and are feeding that back to the research and development arms of their companies. New safety technology is putting company’s operations where its government relations mouth is.”

“Safety is top of mind for decision makers... because they don’t want to create this new mobility ecosystem that is further eroding the pursuit of Vision Zero goals.”

Juan Matute

Deputy Director, UCLA Institute of Transportation Studies

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West Midlands: a testbed for a regulatory framework

In the UK, Transport for West Midlands, is trialling e-scooters in the cities of Birmingham, Coventry and West Bromwich. Private use of e-scooters remains illegal and the pilots will provide guidance to the UK government on the sort of regulatory framework needed to manage e-scooter use on roads.

Anne Shaw, Interim Managing Director Transport for West Midlands, says that many people confuse privately owned scooters with the pilot schemes when reporting safety concerns.

“They are very much a ‘Marmite’ issue [you either love them or hate them],” she says. “Some comments we are getting back from the public are skewed a little bit in terms of not understanding necessarily what the pilot is and what are personal scooters.”

Even though the pilot specified rules around parking, people still initially parked them “all over the place”. The authority worked closely with the operator, Voi, to put in docking stations that were visible on the street to encourage people to park them there.

The pilot also includes geofencing, and the scooters are speed limited to 15.5 miles per hour, and cannot be used past 10pm. Riders must also register with a driving license. Transport for West Midlands also worked closely with the

WEST MIDLANDS



Anne Shaw

Interim Managing Director, Transport for West Midlands

police before the launch to incorporate all aspects of road safety.

“Awareness and education are important and we’ve been working with West Midlands Police to make sure we are getting good intel about any road safety concerns,” says Shaw. “If the regulatory framework does come in, West Midlands Police would be the enforcers of that similar to all other road users and traffic offences. Keeping the police involved has been our priority and one of our key learning points.”

The authority is also in close contact with road safety officers within the local municipalities. And the operator has also worked with Transport for West Midlands and is responsive to “scooping” up any poorly parked scooters.

“This is because it is a partnership pilot and they are not a formal independent operator,” says Shaw. “The pilot will work out how we do that.”

On the bigger picture of responsibility for safety, Shaw says it has to be a mix.

“You have to take responsibility for making sure that the product you are marketing is safe,” she says. “It can’t be left to the public purse always to provide the infrastructure; it has to be shared. There has to be some join up in terms of operators who are gaining an income around this to make sure the network is safe for those products to be used.”

Shaw however can see the benefits and the potential of scooters in the bigger argument over reducing single occupancy car use.

“We are really keen to help formulate those [e-scooter] regulations to make sure we can introduce new concepts of how people can get about but introduce them in a way which is safe for people to use and for pedestrians,” she says. “But it’s really important for us to create that space for innovation.”

Can technology help?

The fourth generation of scooters look nothing like what was first launched four years ago as operators have become partners with cities.

“The first generation of scooters—almost retail and off the shelf—were thrown into an urban environment. It was a disaster,” says Papandreou. “Now, we have fourth generation scooters which are really solid and are integrated.”

Superpedestrian is one operator that is taking safety to the next level. It unveiled in July 2021 a new technological feature that it is trialling in its Link scooters. Through an array of motion sensors fused with highly accurate GPS and machine learning, the technology, called Pedestrian Defense, detects unsafe behaviours like sidewalk riding, wrong-way riding, aggressive swerving and repeated hard braking, that is immediately corrected by slowing or safely stopping the scooter in real time.

“It’s not just about detecting that these things happen but really understanding what’s happening, how do we prevent it from happening, and how do we measure to show that it’s not happening in the future,” says Ben Segal, Director of Research and Development at Superpedestrian.

The technology was developed over three years originally with a view to helping riders locate e-scooters more easily.

“At the beginning you’d see a bunch of scooters on a map and you just couldn’t find the scooter

“It’s not just about detecting [unsafe riding] but really understanding... how do we prevent it from happening... in the future.”

Ben Segal

Director of Research and Development, Superpedestrian



Ben Segal

Director of Research and Development at Superpedestrian

you needed,” says Segal. “You’d have to spend a long time hunting around for it to the point where you just couldn’t rely on micromobility. It made us think that if you know where the scooters are much more precisely that would cut out a big source of the issue here.”

Existing solutions are not addressing the bigger picture of safety, according to Segal.

“Other companies have cameras that sort of beep at you if you’re on the sidewalk but that’s only addressing one part of the problem,” he explains. “It’s really not addressing the core issue of safety. It’s sort of preventing sidewalk riding but not improving safety overall. And that’s really our goal.”

The aggregated anonymised data can provide context to cities on what’s happening on streets and sidewalks and help them target locations that may need maintenance or safety upgrades.

“It’s really a shame that we are not looking at vehicular travel the same way because [the safety concerns for vehicles are] probably 100 times greater.”

Sam Morrissey

Executive Director of Urban Movement Labs

“If ten people are swerving on the street, maybe the city needs to add a bike lane there,” says Segal. “The city wants to know that and they want to know that if they do add a bike lane that it’s making things safer in the future.”

The make-up of the company plays a role too. Segal was previously chief technology officer at Navmatic which was acquired by Superpedestrian.

“Superpedestrian was really one of the few companies we spoke to that makes the scooters themselves, they design them and manufacture them,” he says. “And that gives you so much more room for seeing the technology shine. Our tech is not just a little black box you can drop in and forget about. It requires being tightly integrated into the scooters’ brains and Superpedestrian really has the best brains.”

Morrissey contrasts the holistic safety steps and technology that e-scooter operators are taking with the automobile industry.

“It’s really a shame that we are not looking at vehicular travel the same way because [the safety concerns for vehicles are] probably 100 times greater,” he explains.

“The safety measures scooter companies are taking could be applied to cars. I am disheartened to not see those types of advancements particularly with connected automated vehicles which are solely making sure the person *inside* the vehicle is safe. I’d just love to see the technology Superpedestrian is making expanded to the automotive industry as well.”

