

Micromobility

a UK Roadmap



Executive Summary

“Powered Micromobility Vehicles” (those under ~230kgs unladen weight¹) offer a huge opportunity to decarbonise transport, reduce congestion, improve air quality and reduce car-dependence. The global market for these vehicles is growing exponentially² but the UK is behind in adoption and our vehicle developers have a market share of less than 1% as a result³.

This document sets out proposals which will address these issues, unleashing Micromobility innovation in the UK.

Our work has shown that there is support for PMVs across stakeholders when standards are improved and regulations tailored to different vehicle form factors. The proposals in this document pave the way for the UK to realise the benefits of PMVs, and to move from laggards to leaders in this field.

The key finding is that **one-size does not fit all** when it comes to the needs of, and sensible rules for future PMVs. Around key factors such as the minimum age of users and maximum speed of these vehicles, there is variation in what is considered appropriate from one form factor to another, and legislation must cater for this. Work undertaken by WMG at the University of Warwick with Cenex, supported by TRL and the MCIA over the last year has formed a timeline of actions (Figure 3) which sees the first new PMV type on UK roads as early as mid-2023, with two new types following behind after consultation and trials respectively.

The proposals also enable other new types to follow, supporting the next generation of PMVs with a more agile trialling regime to unleash innovation in the UK which until now, has needed to leave for other countries in order to succeed⁴.

The ‘end game’ for this timeline was outlined in WMG and Cenex’s 2021 “Visions of the Future” document⁵, which lays out eight simple visions of how the future would look by embracing PMVs – better places for people, lower impact journeys, a reduced dependence on cars.

The timeline in Figure 3 shows an overarching new vehicle category created in Primary legislation, which are neither motor vehicles, nor pedal cycles – we call them “powered micro vehicles” or PMVs in this document. The overarching PMV category is in principle permitted on both roads and cycleways, but as few additional rules would be placed on the overarching category in Primary legislation as is practicable, to allow maximum flexibility for future form factors not yet envisaged. Secondary legislation is then used to introduce specific PMV instances or ‘types’, with strict definitions as evidence dictates.

It is proposed that an overarching speed limit of 28mph (45kmph) is applied in Primary legislation to strike the right balance between ring-fencing these vehicles as low-speed alternatives to cars and vans only, whilst not over-constraining future vehicle types. In this document we only discuss three types, of 15.5-20mph maximum speed, but future vehicles such as faster ebikes (“pedelecs” as they are known in Europe), or faster light mopeds could offer further opportunity to reduce car use for short journeys.

The first vehicle type enabled is eScooters – but this should not be mistaken with the wide range of products seen on our streets today. This is a class of high-quality, rigorously-tested machines with registration marks and unique identification. In addition to enabling a market in approved scooters to flourish, new innovative concepts would also be enabled⁶ (see example in Figure 1).

The second vehicle type proposed is Light Electric Cargo Vehicles. Like the eScooter, this emerged from our work with clear latent demand and industry backing. Despite there being many of these vehicles in operation illegally already today (due to the presence of a throttle allowing them to be propelled without pedalling), this new type sets a high bar for safety and product integrity, with a proposal for consultation followed by legalisation. This non-pedal-assisted vehicle paves the way for much wider adoption of lightweight delivery vehicles in place of cars and vans. Once again, in addition to enabling a market in type-approved versions of vehicles seen today, new innovative concepts⁷ would also be enabled (see example in Figure 2).

The third new type proposed is a new “Electric Light Moped” type, identified by the motorcycle industry via the MCIA as a natural pathway to powered-two-wheelers in the current “L-Category” road vehicle regulations. Subject to trials to confirm its suitability for cycleways, this could enable significantly lower impact journeys than by car, over potentially longer distances.

The trialling of new types like the Electric Light Moped is enabled by the powers set out in Primary legislation. After this, Secondary legislation may be

used to support trials and studies to be conducted as need arises, representing a far more agile opportunity for regulations to evolve in the future than has been possible to date. If these proposals are adopted, the UK is positioned to trial and learn on the front foot with transport innovation once again.

Scaled trialling should be a key part of major transport decision-making. This applies not just to the vehicles, but also to infrastructure design, and integration. Infrastructure must work hand-in-glove with new PMVs, if adoption potential is to be realised. An example of how these proposals support this development could be the topic of lower speed limits in densely packed urban centres, and higher limits elsewhere. Can speeding in cycle lanes be policed effectively? Could it be enforced with technology? Could this allow vehicles such as Electric Light Mopeds or even lower L-Segment vehicles which have the capability to travel faster than current modes in that area, to use that infrastructure making them ‘vulnerable road user lanes’ rather than cycle lanes? – all of these questions require trials or technology, infrastructure and vehicles to learn and refine proposals before changing transport systems across the nation and these proposals enable that innovation to flourish.



Figure 1 - An innovative concept enabled by these proposals



Figure 2 - Polestar final-mile delivery vehicle concept

¹ SAE definition J3194

² 20200316_EY_Micromobility_Moving_Cities_into_a_Sustainable_Future.pdf (voiscoters.com)

³ Vivid Economic research for Innovate UK, 2021

⁴ “TAUR had planned to launch in London. However, the UK remains the only country in the G7 yet to legalize privately-owned e-scooters” - Taur Technologies secures £1.3 million seed investment from Trucks VC - UK Tech Investment News (uktechnews.info)

⁵ https://www.linkedin.com/posts/wmgbusiness_a-vision-for-micromobility-in-the-uk-activity-6867061935678988290-pJPA?utm_source=linkedin_share&utm_medium=member_desktop_web

⁶ <https://www.linkedin.com/pulse/micromobility-uk-time-widen-our-innovation-john-fox>

⁷ Polestar Unveils Last Mile Delivery Vehicle – Re:Move - The Detroit Bureau

Whilst these proposals are a critical enabler to this future, it is acknowledged that legislation on vehicle types alone will not be sufficient to support adoption by the 'wider majority'. There are key factors that, as with active travel modes, will require support through research, policy decisions and targeted funding.

The key topics outlined and reinforced many times in our work were;

Inclusive and accessible

Inclusivity, accessibility, and equitability are fundamental to enabling PMVs to displace cars; there is no reason why PMVs cannot be all of these things but policy must consider each change carefully with these critical factors in mind. These principles must be maintained for both users and non-users of PMVs; recognising that PMVs will not be suitable for all whilst ensuring no direct or indirect negative impacts for anyone. The proposals in this document seek to directly enable wider adoption, with opportunities for two person Micromobility vehicles, and wheelchair-attached vehicles included in the recommendations.

Infrastructure

We must make space for PMV in our public realm, this includes segregated and safe PMV routes, and secure and available parking. The trialling opportunities enabled by these proposals should be used to develop new and innovative solutions to make lower-impact journeys as easy as practicable.

Multimodal Journeys

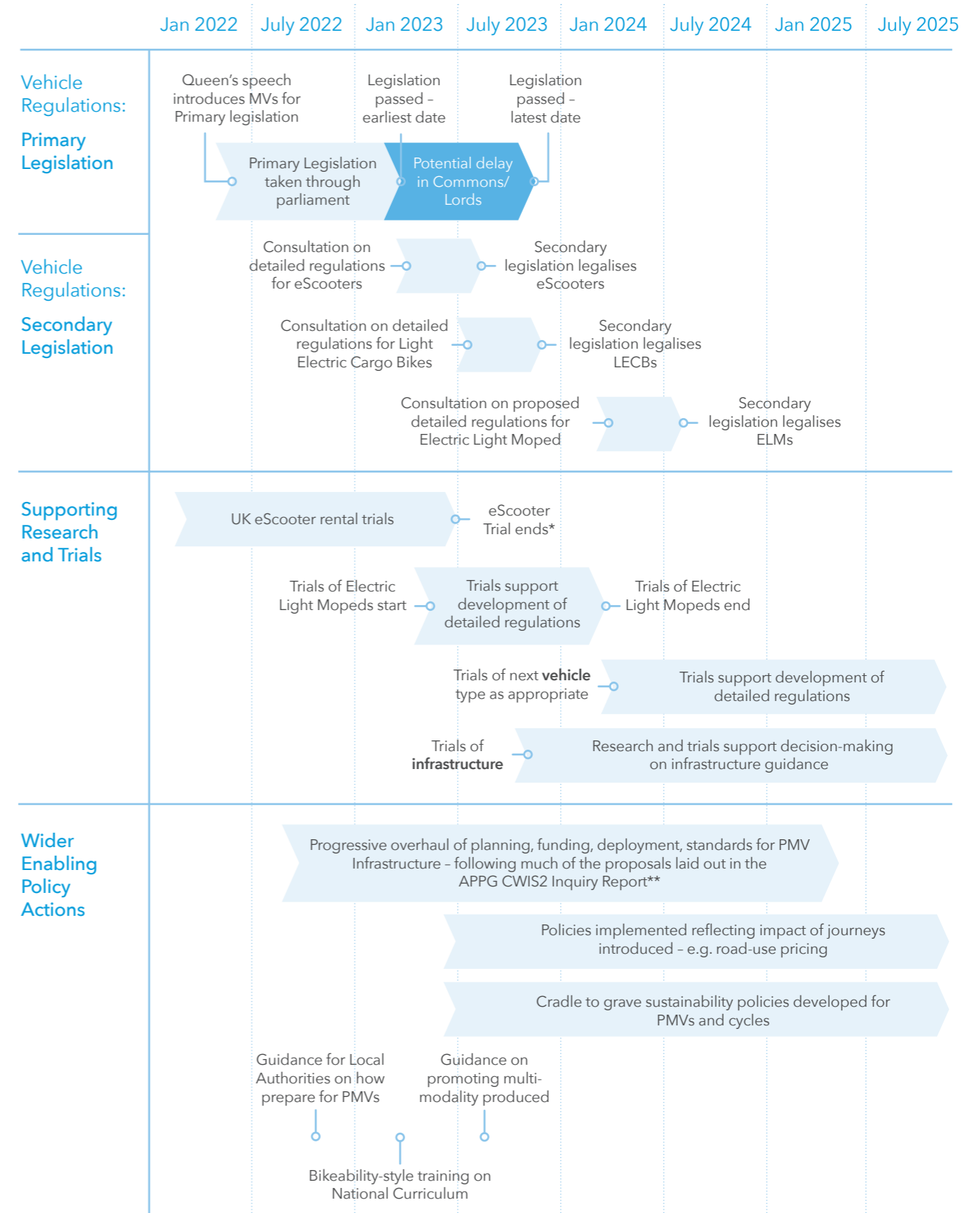
We must ensure a joined-up approach to sustainable transport options, so that PMVs, active travel and public transport combine to present a viable and attractive alternative to personal car usage.

Behaviour Change

This future state represents a culture shift. Whilst many are desperate to enjoy these vehicles today, for others PMVs and active travel need further work if they are to present as a more attractive option to car use. In practical terms this means ensuring 'sticks' - e.g. ULEZs are introduced alongside 'carrots' - e.g. redesignation of space for cycles and PMVs with increased secure storage, and financial incentives to encourage adoption and use of active travel and PMVs.

Timeline

Figure 3 - Proposed Roadmap for Powered Micro Vehicle Adoption in the UK



*this assumes eScooter trials are extended again to meet legalisation date to avoid a break in continuity of service for those now relying on scooters.

**(<https://allpartycycling.org/wp-content/uploads/2021/09/APPGCW-indd-3.pdf>) - many of the proposals around infrastructure in the APPG report on "Reaching Our Active Travel Potential" were raised again in our workshops, reinforcing their recommendations. The cautionary note being that focussing on only 'active' travel risks missing many of those in the 'early and late majority' of adopters who may prefer powered alternatives to the car.



1)

Specific Proposals on New Vehicles Types

Three initial vehicle types are proposed for inclusion in early secondary legislation.

The first is eScooters, based on experience from around the world and from the UK trials. Details of the regulation proposals should be consulted on, but knowledge of this vehicle type is very high.

The second type is Light Electric Cargo Vehicles, enabling much wider adoption for a wider demographic of delivery riders. Once again, details of the regulation proposals should be consulted on, but a large number of these vehicles are believed to be in operation around the UK already.

The third type is Electric Light Mopeds, proposed by the motorcycle industry via the MCIA, which should be trialled as a priority with the aim of confirming integration with traffic and other modes. This type would provide a credible pathway to powered-two-wheelers in the current "L-Category" road vehicle regulations, and thus enable significantly lower impact journeys than by car, over potentially longer distances.



The following tables summarise the proposals for each of these new vehicle types.

eScooter

Variable	Regulations	Rationale
Maximum Speed	15.5mph (with potential for lower speed limits in specific areas where riders may encounter more hazards e.g. shared spaces).	<p>Most agreed this figure to be the most familiar and aligned to other countries/modes (i.e. EPACs).</p> <p>An argument was put forward for a 12.5mph top speed on the basis of safety, with evidence showing current experience with scooters indicated they are less stable than bicycles. Whilst a 12.5mph would align to many UK trials⁹, on balance 15.5mph is still recommended. The roots of 15.5mph are not scientific, however the additional complication associated with having a different limit for scooters, along with a greater closing speed for EPACs and road traffic would introduce new risks.</p> <p>It must also be remembered that current data on e-scooter incidents is not able to differentiate between rental e-scooters and illegally used, potentially poorly designed scooters (for example with very small wheels). The proposals in this document rule out such vehicles with a strong focus in type approval requirements on making sure only well-designed scooters are legalised. Hence on balance it would introduce new risks and amount to legislating for poor design to set a 12.5mph limit for this type</p>
Maximum Power	500W rated	<p>Many pointed out that power limits are a blunt instrument, however they were still considered a mitigation in the event of tampering. A maximum power of 500W aligns with UK rental e-scooter trials, and on the basis of TRL research⁹ broadly aligns with the median power of e-scooters currently available in the private market; a 250W limit on the other hand is likely to be fairly exclusory. It is also in line with German regulations which many high-quality products already align to.</p>
Weight Limit	55kgs (including battery, without rider).	<p>Once again, this is in line with UK trials and German regulations. Most standing e-scooters currently available on the market are below this weight.</p>

⁹ UK is lowering e-scooter speed limits (MindTheZag) - London Reconnections

eScooter continued

Variable	Regulations	Rationale
Type Approval	Required Independent testing of some features, self-certification of others to balance cost and risk of non-compliance.	<p>Critical to raise the standard of scooters in order to ensure safety, however raising the cost of compliance so high as to make product retail prices unaffordable would be an error.</p> <p>Many agreed that on balance, a degree of independent testing should be required to police compliance, with a suggestion being external certification on meeting specified standards.</p> <p>Key leading requirements proposed for the eScooter type (to be consulted on formally) included;</p> <ul style="list-style-type: none"> • Construction • Dual brake actuation requirement (at least one mechanical, may include retrograde for second braking method) plus minimum rate of deceleration. • Throttle control (max acceleration) • Minimum wheel diameter • Indicators • Running sound emitter • Alerting sound emitter (i.e. a bell or similar) • Lights fitted front and rear, to be illuminated at all times • Vehicle Identification Number (VIN) stamped onto frame or applied in tamper-proof format • Minimum battery safety requirements • Maximum vehicle width (potentially aligned to cargo bike width, rendering it unlikely to be a limiting factor but ensuring compliance with cycle lane design width) • Specific form factor rules and permissions including: <ul style="list-style-type: none"> - Number or passengers as specified by manufacturer* - No pedals to propel the vehicle - No limit to number of wheels** - No specification on seated/unseated by design



⁹ <https://op.europa.eu/en/publication-detail/-/publication/b042f558-a319-11eb-9585-01aa75ed71a1/language-en>

eScooter continued

Variable	Regulations	Rationale
Vehicle Registration	Vehicles required to be registered - via VIN and registration mark.	<p>This is a barrier to entry for riders, however it is one which is considered necessary in order to identify illegal vehicles, as well as combat theft.</p> <p>The mechanism does not require car style V5 'logbooks' or full-size number plates (which are impractical), rather something akin to an online database readily available to authorities and amended by a new owner when they buy a scooter.</p> <p>The DfT should consider the right balance of cost vs. benefit for these measures, however in its simplest form it should include;</p> <ul style="list-style-type: none"> • A database recording VIN, insurance expiration (if applicable), scooter model and unique registration number. • A number plate issuing system providing a specific format number plate which must be displayed on the vehicle (in a tamper proof manner as noted above). <p>*This regulation is in place to open up space for innovation in two-person vehicles, enabling wider participation for those with disabilities for example. If through consultation this is deemed to require more trialling before moving away from this class being a single-person only vehicle, then an immediate package of work to identify an additional new vehicle type specifically designed to enable those unable to ride alone to benefit from micromobility should be launched, to ensure the developing ecosystem is inclusive from the start.</p> <p>**Note that this enables innovative concepts like three-wheelers (see Figure 1), and single-wheeled 'wheelchair attachments', like those being trialled by some rental providers¹⁰ and available to buy online.¹¹ Consultation may reveal a preference to disqualify form-factors like mono-wheels and balance boards, by introducing requirements such as a mechanical steering system. The work presented here has not focussed on such form factors; a wider evidence-gathering exercise may be justified before enabling them, therefore.</p>

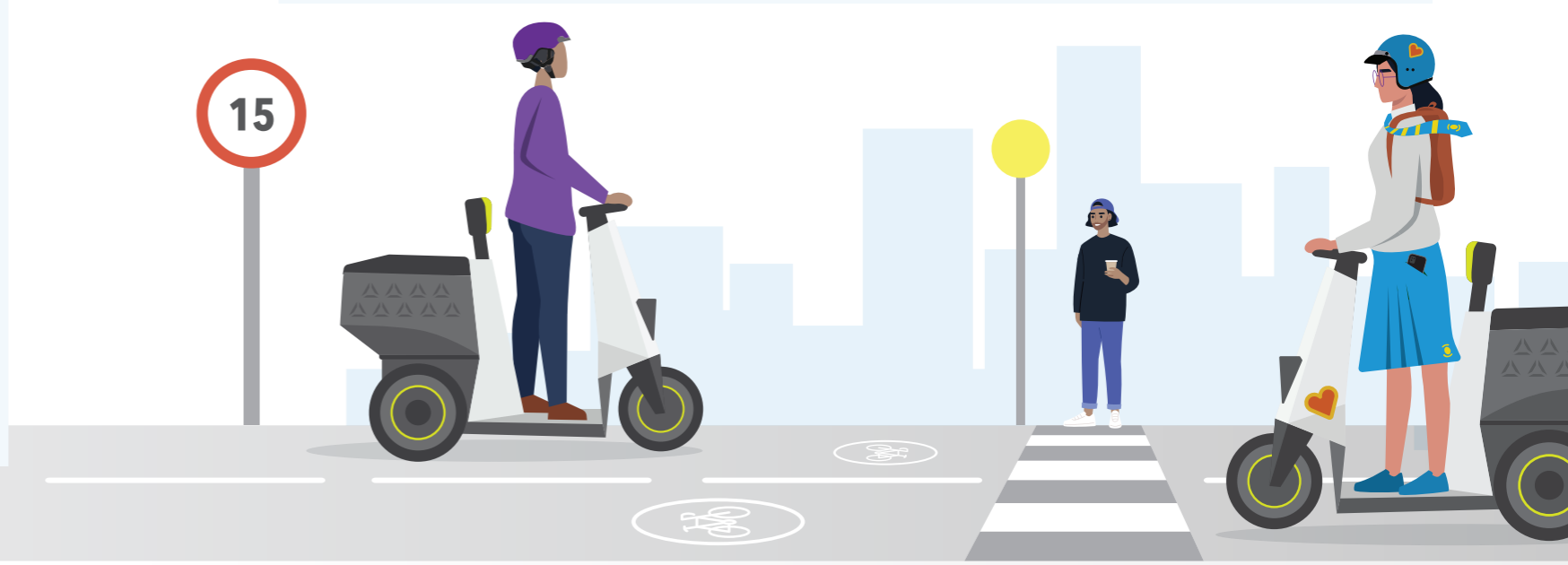
¹⁰ Bird tests motorized wheelchair attachment in NYC | TechCrunch

¹¹ Search google/amazon/ebay for "electric handcycle wheelchair attachment" for a range of examples

Variable	eScooter regulations	Rationale
Licensing/ Training	No licence required, though Bikeability-style training strongly recommended and made available to all children before turning 14.	Licensing is a barrier to entry which is not required for EPACs. The value is in the training before gaining any licence in any case, and the Bikeability model was consistently outlined as a good fit for this as the only Government-backed training standard. This approach offers trickle-down benefits of knowledge about road hazards and road positioning etc. and will make those who do go on to drive cars much more aware of PMV users and other vulnerable road users, and those who go on to ride motorcycles more experienced by the time they do so.
Minimum Age	14+	This opens up a huge opportunity for reducing school run traffic, and allows the next generation to start adult life without in-built car dependence. This is in line with EPAC rules today, but should be taken hand in hand with training being available to all school children before reaching the age of 14.
Vehicle Tax	Not required	Broad agreement in workshops that this is an unjustified barrier to uptake at this stage.
Vehicle Insurance	Not required, however if deemed to be required subject to consultation, this should be via annual flat fee payable online for third-party liability.	Similarly to road tax, many agreed in workshops that this is a barrier to uptake which should be avoided, and pointed to no insurance requirements for EPACs and pedal cycles today. Those who did feel insurance was required largely agreed that it must be affordable; a flat fee to avoid a "postcode lottery" is preferable, in line with the German market where a 29 Euro fee is payable each year. More than one participant in the workshops also proposed a reduced rate for those able to evidence having taken part in an approved training course, acting as a mechanism to encourage all to undertake the training.



Variable	Regulations	Rationale
PPE requirements	Strongly recommended, but not mandatory.	Helmets reduce injuries and can save lives, however new risks emerge when legally mandating their use such as a lack of inclusivity (accommodating religious headwear or different racial hair types can be problematic ¹²) and personal safety concerns (it was pointed out that losing one's helmet could leave a rider stranded). It should also be noted that the ideal design of a helmet for riding a scooter may differ significantly from that of bicycle riding. The proposal for strong recommendation is in line with EPACs and pedal cycles.
Enforcement	New civil offences created to allow PCSOs to issue fines for issues such as riding on pavements. Criminal offences for more serious issues (e.g. cloning a scooter VIN or number plate) and riding under the influence of drink or drugs.	Currently only criminal offences exist to tackle low-level issues. Strong on anti-social use should be an issue which local authorities are enabled to tackle. This was a key frustration from those currently running trials - they are less able to tackle scooter riders than pedal cyclists as it stands. Criminal offences should be considered for higher-grade offences such as passing an illegal vehicle off as a legal one, and many suggested tampering with vehicles in order to allow them to exceed the speed limit should also constitute a criminal offence. Current offences such as drink-riding should remain in place.



¹² Seattle Bike Helmet Rule Is Dropped Amid Racial Justice Concerns - The New York Times (nytimes.com)

Light Electric Cargo Vehicle

Variable	Regulations	Rationale
Maximum Speed	15.5mph (with potential for lower speed limits in specific areas where riders may encounter more hazards e.g. shared spaces)	Most agreed this figure to be the most familiar and aligned to other countries/modes (i.e. EPACs).
Maximum Power	2kW rated	Some suggestion that power limits are a blunt instrument but considered a mitigation in the event of tampering. Higher power required to ensure cargo bikes can move off and get up hills with higher loads however consultation on power limit suggested as this was lacking a broad evidence base.
Weight Limit	Max gross vehicle weight capped at 600kg.	Maximum figure provided by workshop participants on both logistics and manufacturers side. This figure should be consulted upon, as figures ranges from 400-600Kgs in workshops and once again evidence base was not broad. Some participants confirmed they already operate pedal vehicles up to 600kgs today ¹³
Type Approval	Per Scooter	Per Scooter, with some potential to consider via consultation a minimum stability requirement due to risk of toppling with large load. Maximum width proposed via workshops of 1.2m.
Vehicle Registration	Per Scooter	Per Scooter however the recognition of specific training course (e.g. Bikeability-style) provides employers a clear course of action to train employees to a minimum standard.

Light Electric Cargo Vehicle *continued*

Variable	Regulations	Rationale
Licensing/ Training	Per Scooter	Per Scooter however the recognition of specific training course (e.g. Bikeability-style) provides employers a clear course of action to train employees to a minimum standard.
Minimum Age	16+	Heavier payload increases risk relative to scooter.
Vehicle Tax	Per Scooter	
PPE requirements	Per Scooter	
Enforcement	Per Scooter	



¹³ Tender 2500 - Urban Arrow Europe

Light Electric Cargo Vehicle *continued*

Variable	Regualtions	Rationale
Maximum Speed	20mph	This vehicle offers a progression towards powered two wheelers available in the L-Segment, and might be used over longer distances than eScooters. The vehicle would be attractive for users providing barriers to entry are kept low, and trials are undertaken to consider whether it is/how to make it suitable for cycleways.
Maximum Power	1kW rated	Higher max speed than eScooter
Weight Limit	As declared by manufacturer (no type limit)	Per current motorcycle regulations, the manufacturer declares the maximum weight. Type tests such as deceleration rate are then conducted on max permissible weight.
Type Approval	Per Scooter	Per Scooter, with change to requirement to be seated due to increased maximum speed.
Vehicle Registration	Yes	Registration required per rationale for scooters, but further work and consultation required on whether a full number plate or simpler system like scooter.
Licensing/ Training	CBT License	This provides a bridge to L-Cat vehicle use in the future, however this decision should be reviewed in the context of potential wider licence simplification for the L-Category.
Minimum Age	16+	Higher speed vehicle compared to an eScooter, bridging the gap to faster L-Segment powered-two-wheelers at 17+.
Vehicle Tax	Not required	Extremely low-impact 'starter' vehicle, hence barrier to entry should be kept low. This can be reviewed in the future if uptake dictates.

Light Electric Cargo Vehicle *continued*

Variable	Regualtions	Rationale
Vehicle Insurance	Per Scooter	Extremely low-impact 'starter' vehicle, hence barrier to entry should be kept low. This can be reviewed in the future if uptake dictates.
PPE requirements	Motorcycle helmet mandatory	Higher-speed vehicle bridging the gap to more powerful vehicles.
Enforcement	Per scooter and current powered-two-wheelers	New civil powers would allow low-level misdemeanours to be tackled, with the usual offences such as drink-driving etc. remaining in place per full motorcycle/car today.



2) Workshop Findings



Overarching Strong Messages

Strong themes emerged during our work. It was repeatedly stated and reinforced, that **every potential hurdle to uptake must be strongly justified**. Nobody disagreed that we should be encouraging uptake of PMVs to reduce reliance on cars, but most participants highlighted areas where a hurdle introduced in the name of safety may crush potential ridership.

Credible evidence that injuries occur due to the use of PMVs was highlighted in our workshops¹⁴, but such evidence must be considered in the context of many thousands dying every year from poor air quality, as well as road traffic accidents caused by motor vehicles, hence providing viable alternatives to motor vehicle use should be pursued.

Overarchingly people agreed that every rule and regulation needs to be strongly justified, and lower-barrier-to-entry alternatives considered – an example being training over licensing, which was discussed many times. Only when absolutely necessary should barriers be introduced if we are to realise the bigger picture.

There was an **overreliance on picking from rules and regulations that already exist, and leaning to one extreme or another** early on in our workshops. This can be helpful (known efficacy) but should not be a constraint. Bicycle regulations would arguably under-regulate, motorcycle regulations would arguably overregulate – hence following discussion around the objectives of regulations, most workshop participants agreed a mixture along with some new ‘in-between’ options appears to be the best way forward. We can never hope to be a leader in future transport if our innovation is bound to be drawn from the past.

Leave Bikes and eBikes alone was a message which was heard loud and clear. There was widespread though not unanimous agreement that rules for existing bikes and EPACs (‘slower’ ebikes) should be left alone, so as not to risk slowing the excellent uptake we are seeing across the western world in recent years. The only fringe exception to this being the on the topic of ebike anti-tampering measures, which is discussed later on.

Everyone agreed current regulations are not fit for purpose, but changes and communication of them needs to be carefully planned and consulted upon.

There was unanimous agreement that current regulations need to be changed, with the vast majority of participants agreeing the UK is missing out on opportunities to benefit from greater adoption of PMVs as a result.

There were also however broad concerns that changes could be presented in a confusing or complicated way – with calls to make changes as simple as practicable, as flexible as possible (to provide agility for future trials and changes) and for a clear communications plan to be part of the change process.

There was recognition also that equality and accessibility must be considered from the start as we adopt these new modes of transport, which could present wonderful opportunities or unnecessary risk to many groups of society depending on the implementation decisions we make now. The themes that emerged on this in our workshops are discussed in this document.

¹⁴ PACTS-The-safety-of-private-e-scooters-in-the-UK-Final-Report.pdf

Specific Topics

Speed Limits

Overarching speed limits for all PMVs and roadway types are not appropriate, as much like cars and trucks this should vary by situation and by vehicle specification. An absolute maximum should be applied, but it should vary by type. For new types such as the Electric Light Moped type, trials should demonstrate the appropriateness of the proposed 20mph speed limit. The key is to acknowledge that one size does not fit all.

In areas with many crossings, or little segregation from pedestrians, something lower than all of the above may be needed and in time speed limit signage may be developed to make this clear to riders. Equally, there may be a case for interurban routes to have higher limits in the future. A challenge highlighted in the workshops is 'reading' one's speed on an PMV where highly visible speedometers are not commonplace hence for faster vehicles like the Electric Light Moped this may form an important requirement from trials. The proposal on balance is to utilise maximum speed limits per type, whilst bolstering enforcement mechanisms (see "Enforcement" below) for riding recklessly.

Closing speed was highlighted repeatedly as a key concern, and this was reflected in a view that a 20mph speed limit for motor vehicles should be the blanket maximum in densely populated urban areas where there is not segregated space for PMVs.

Power and Weight Limits

Power limits were recognised by most technically aware participants as being a poor curb for things like top speed and acceleration risk, as well acknowledging variability in the proof of compliance with such limits in practice in any case.

There was however some agreement that a maximum limit does mitigate the impact of tampering should it occur, but this was coupled with strong agreement that any such max figure should vary by type. 500W for an eScooter may be enough, but this would not be the case for a non-pedal assisted cargo bike or a balance vehicle for example.

As a footnote on power; this document discusses "continuous" motor power in line with most current regulations, however it acknowledged that this is a complex topic. The way an electric motor works, and how it is deemed to be able to deliver "continuous" power is a grey area, hence research may be justified to determine an appropriate way to limit 'peak power' in the future. It should be noted that in this case, like much of this document confirms, one-size would not fit all, meaning any such limit would likely need to vary per PMV type.

Similarly weight limits were agreed as important, but these should also vary significantly by PMV type.

It was highlighted by some that there are more effective product safety measures which should be considered as well as power - such as stopping distances and redundancy in braking systems, hence these have been added into the proposal for Type Approval requirements.

Vehicle Registration

There was some consensus that a form of unique ID, with a database behind it which allows linking of rider and vehicle is an important requirement for PMVs. Despite a strong push to avoid raising the barrier/costs of ownership for PMVs, without this it becomes difficult to verify that a vehicle is what it purported to be which perpetuates the current 'wild west' of poorly designed vehicles circulating alongside well designed (but ultimately still illegal) examples.

The exact details of what this registration system should look like need to be trialled and consulted on formally, but it must strike the right balance between cost to administer, benefits realised and barriers to entry introduced.

A small number of participants called for full licensing; with a full registration plate and vehicle V5 etc. but there was much broader agreement that any such move would need to be carefully considered in the context of the trade-off outlined previously, along with the simple practicality of full-size licence number plates, designed to be read at upwards of 100mph, being applied to PMVs

The introduction of a stamped/tamper-proof VIN (vehicle identification number) was discussed, and this may have merit to support such a database and support the tackling of theft of PMVs and cycles which currently acts as a discourager to uptake.

Licensing/Training Requirements and Minimum Age

It was repeatedly highlighted that a lower age limit than 16+ for personal transport like eScooters could open up a huge opportunity for reducing school run traffic, and allow the next generation of UK citizens to start their adult lives without an in-built dependence on the car leading to long-term benefits.

A figure which featured many times was 14+, although there was nervousness from some over the lack of evidence on which to base this. This is in line with EPAC rules today however, and there was a strong view that if use were coupled to every child having access to training (akin to the Bikeability standard for cycling) the risk would be mitigated.

Training in general was strongly favoured to licensing as the need for a licence was seen as an increased barrier to entry and as such, should be avoided for low-speed vehicles. This was particularly felt for the young, who will not have driven cars yet to learn road sense.

Application of the Bikeability model to PMVs received widespread support, with the only concerns raised being around patchy availability today (volunteers-only in Scotland for example). Although coming at a cost, making a Bikeability Level 3 equivalent available on the National Curriculum is recommended as a low regret action with high potential return in resultant car use and road traffic accident reduction.

Verification/enforcement of people having taken the training would be extremely hard to administer hence mandating the training was not proposed, however other nudge factors such as service operator app recommendations, point of sale vouchers, reduction in insurance costs (if required), and mandating for business-use could reinforce the benefits of PMV training, and open up older generations to taking courses.

The lower age outlined above was not proposed to apply to all PMV types though - for example faster Electric Light Mopeds, or heavier Light Electric Cargo Vehicle vehicles should be 16+ as a minimum.

It was highlighted that the most serious incidents for PMVs are with motor vehicles. In addition to the recent Highway Code reassignment of

responsibility, driver training should also be modified to include a much greater emphasis on driving safely in environments shared with PMVs and other vulnerable road users to make roads safer for all.

Supporting wider adoption: Behaviour change

There was an acknowledgement from all sessions of a need for a culture shift to enable widespread PMV adoption. This shift is both for changing attitudes towards PMVs and changing attachment to personal car usage. However, the perception of the scale of this challenge varied between the sectors.

Local Authorities are at the 'coal face' of encouraging and enabling modal shift, but also have greater concerns about the public's acceptance of PMVs. A consistent message was a need to educate early - echoing the calls above to implement Bikeability-style training with the national curriculum - and the need to designate civil offences to allow low-level enforcement (see "Enforcement" section below). Feedback from the sessions was that action should be taken to address misconceptions, particularly regarding safety and misuse.

The Local Authorities expressed the need to properly fund behaviour change interventions and initiatives. Those working on delivering modal shifts need better access to sound research. Testing and trying interventions (including those which discourage personal car use) and sharing best practices will be important for encouraging wider uptake.

Vehicle Type Approval

There was almost unanimous agreement that something above and beyond product standards should be required for PMVs - so a 'Type Approval' of some kind, which would vary for each 'type' of PMV.

Many felt self-certification would be sufficient, with key areas of focus raised being construction, braking, minimum wheel size, and requirements around driving dynamics, but several participants expressed a nervousness about no independent involvement. A balance is proposed, with some independent testing of key features but otherwise self-certification to keep costs down.

Tampering was raised as a concern many times and was proposed to be outlined as a criminal offence by some (see 'Enforcement' section). The Bicycle Association and many other cycling industry stakeholders have signed up to an anti-tampering initiative called "Companies against Tampering" as the cycle industry seeks to mitigate the significant risks presented by tampering - it would stand to reason that type-approval requirements outline an obligation to make products tamper-resistant.

Supporting wider adoption: Inclusive/Accessible vehicle types will be important to wider adoption.

There was agreement that there needs to be a wide range of products, and that regulations should not prevent or impede this. Representation from different minority groups in the design of products and services and their regulation is key. The majority felt there is a need to undertake more research into the development of PMV products and services for marginalised groups. The ability to test and trial different vehicle types will be important. There was an acknowledgement that the market will service the easy wins from all sectors, therefore funding should focus on supporting the needs of groups at risk of being left behind and not support services and development in general. The proposals in this document specifically enable vehicles with more wheels which will balance when stationary, vehicles for more than one person, and vehicles which can attach to a wheelchair. This enables products to be produced for people with a wide range of abilities and disabilities to access micromobility.

Vehicle Tax and Insurance

Taxing PMVs was considered inappropriate by all when seeking to drive adoption.

There was a mixed view on insurance; many questioned when we are seeking to minimise barriers to entry, why would we mandate insurance? - especially as bicycles do not require it today.

There was broad consensus however in agreeing that if third-party liability insurance were required, it should be offered in a similar manner to the German system of a flat and affordable fee per year (29 euros when introduced, with an adhesive sticker applied to the vehicle to confirm purchase).

Cycleways Vs. Roadways

There was unanimous agreement that access to cycleways is crucial for adoption, with many identifying specific needs which may impact the design of cycleways and vehicle regs in tandem. Specifically, a max width (particularly for cargo vehicles) is needed (largest proposed was 1.2m) and the need for loading/off ramps for eCargoBikes and the Light Electric Cargo Vehicles proposed in this document - both of these issues impact cycleway design.

Supporting wider adoption: Infrastructure

One of the clear messages from the discussions was the intrinsic link between the development of good PMV infrastructure and measures to restrict and limit personal car use. Integrated planning of PMV infrastructure, public transport and efforts to limit car use is needed. There is a risk that PMV routes and infrastructure will take space from pedestrians (which is often already insufficient) if not considered as such. Secondly, if measures to restrict private car use are put in place without viable alternatives, they will not succeed. Good PMV routes should make users feel safer. There is some debate around the extent to which good infrastructure improves the perception of safety and actual safety, but drawing on best practice from cycling, this should involve physical separation of motor vehicles and PMVs where possible, as well as physical separation of PMVs and pedestrians. Linking it with behaviour change will be important here.

There was a desire for stronger planning emphasis in planning new homes and businesses to incorporate PMVs. It is important to note that infrastructure is not just paths; parking and end of journey facilities are significant factors in promoting wider adoption. Parking provision for different types of PMV should be part of the solution, and it should be accessible, safe and in the right place. It also means exploring how users without room at their own home can safely store PMVs and how workplaces and destinations can support PMV users with showers, changing facilities and lockers.

There was limited knowledge of the LTN 1/20 on cycling infrastructure across the groups. Whilst the cycling infrastructure design requirements and guidance in parts consider different sizes of PMV

and EPACs, wider adoption of different types of PMV could disrupt existing cycling infrastructure. Consideration of various sizes, speeds, weights and positioning of PMVs may require specific guidance on factors like road segregation, shared space, size of lanes, parking provision and road surfacing.

Feedback from local authorities was that funding for infrastructure needs to be cohesive and allow for long term planning and strategy. Working from funding bid to funding bid does not allow for the trial, testing and implementing measure and does not allow for a long-term strategic infrastructure plan to be put into action. A potential solution is that the Local government should seek funding from measures to restrictive car usage (WPL, Congestion chargers). Raising funds this way provides long term investment as well as demonstrates how the reduction of car use can support travel alternatives.

Personal Protective Equipment (PPE)

There was a clear divide in opinion on PPE, specifically with regard to helmets. Some looked at evidence of injuries and suggested mandating helmets, but inclusivity and personal safety risks were pointed out; what about religious headwear/hair¹⁵? What if someone has 'lost' their helmet during the day, are they now stranded?

The risk depends on the vehicle form factor, with cargo bikes being considered relatively safe without a helmet but eScooters less so, however on balance for both form factors a "strong recommendation" to wear a helmet is proposed rather than a mandate on lower-speed applications (below 15.5mph). This argument does not hold for potential future types where speed increases - for example the Electric Light Moped is proposed to require a motorcycle helmet due to the increased speed.

Enforcement

Local authorities highlighted the challenge of enforcement as a local issue in many ways, but one which requires national consistency of suitable powers. Specifically, civil offences (not criminal as is the case today) should be outlined to allow enforcement by community support officers as required - this would be more proportionate than the current situation with eScooters, for example.

"High Tech" solutions were recognised as likely to be less effective, with geofencing splitting opinion throughout. Generally, those authorities who had experience of it saw it as important, but not a 'holy grail'. On balance, it was seen as a good secondary tool but should not be relied upon to enforce PMV laws (there is grounds for further research and trials on how this might change in the future however).

There was unanimous agreement that drink-driving/riding should remain an offence - though discussions did not focus on punishment.

Tampering was raised many times, and risks undermining all regulations. There was a strong view that it needs to be tackled, both through making it harder, and dealing with those who break rules. Some participants suggested it should be made a criminal offence, and there may be merit in making it illegal to sell devices specifically targeted at increasing maximum speed.

Supporting wider adoption: Multimodal - Joined up

The workshop groups described the connection of PMV and other forms of transport as essential to providing a viable option for private car usage. There are some quick wins in this area, with good examples of pilot practices linking sustainable transport options available.

The development of pilot mobility hubs are one example; they make it easier to use several different types of transport for one journey. As we see an increase in the rollout of mobility hubs, we can learn from research and evaluation of their impact to aid further adoption. The groups described data and information as key enablers. The sharing of data and the capacity to properly analyse will give a better understanding of users' needs and provide information to users.

Public transport vehicle and service design need to incorporate micromobility better (e.g. space for parking, taking bikes onboard). We have seen some examples of this around the UK. However, it was the feeling of the workshop participants that more work is needed with public transit operators to help them understand the benefits to their service of PMVs and invest in finding a way to accommodate integration. Where there are concerns (for example, battery fire safety), standards are needed in the short-term as well

¹⁵ Seattle Bike Helmet Rule Is Dropped Amid Racial Justice Concerns - The New York Times (nytimes.com)

as research to further improve this in the future, demonstrating highly safe products and working practices – after all, people carry laptops and power tools on public transport safely today, despite their similar battery technology. It is worth noting that no public transport operators attended the workshops – though invited. This lack of engagement may indicate that they do not perceive that they have a role to play, or that PMVs will not impact their operations.

A key mechanism to increasing multimodal transport options for users is around payment, ticketing and cost. Users need transparency on costs, and cost-effective ticket bundling options are needed. However, there was limited discussion around MaaS applications, focusing on the ease of access for the user.

Much of achieving this sits with public transport operations and service operators; however, Local Authorities can promote change through procurement. Procurement can be a lever for change; providing frameworks and guidance to set standards can encourage multimodal integration (data sharing and public transport design).

Sustainability

It was agreed that a framework and standards are needed nationally, and internationally as until such time any claims are far too open to interpretation and “optimistic” assumptions. It was pointed out that Local Authorities can use procurement to ensure sustainable shared services – but they need guidance and standards on what this is too.

Lifecycle analysis (LCA) was agreed as needed, but once again an agreed methodology and measure is required before it can produce meaningful results. The “producer pays” scheme works well, so this could be developed with UK industry as it grows and would encourage more sustainable manufacture and recyclable products.

If standards existed for LCA of both batteries and products, users could then be better informed with a “carbon rating” on products which may begin to impact manufacturers’ decision-making processes.

Appendix 1: The process

To produce this document, WMG with support from Cenex conducted the following sequence of activities;

1. Research
2. Producing a clear Vision statement to guide the work
3. Consultations
4. Industry Workshops
5. Roadmap development including additional consultations

Each of these steps is briefly explained in this appendix.

Research

Desk-based research on hundreds of documents around the topic of active travel and micromobility from across the world. The aim was to understand the case for micro-vehicles, what has worked, what has not worked, and what has been proposed.

References of particular value included TRL’s work for the European Commission¹⁶, work from the Parliamentary Advisory Group for Transport Safety¹⁷, the MCIAs work looking at future journeys¹⁸, work from the All Party Parliamentary Group for Cycling and Walking¹⁹, and work from the International Transport Forum²⁰. There were also many useful inputs from industry actors proposing future rules and regulations, and service operators outlining opportunities and risks.

Producing a Clear Vision Statement to Guide the Work

Before embarking on the process of creating roadmap, it was critical to align on where that roadmap should take us. We produced “A Vision for Micromobility in the UK”²¹ which proposed eight simple visions to support a future where micromobility is the best choice after walking, for first and last mile journeys and deliveries.

The visions were:

- Micromobility vehicles can be owned, leased and rented
- Micromobility seamlessly connects to and enhances other forms of transport
- Micromobility is delivering profound carbon and harmful pollutant emissions reductions
- Micromobility is a safe form of transport, for users and non-users
- Micromobility has developed in a way that ensures nobody is excluded or negatively impacted, as far as practicable
- Micromobility has supported better urban design and placemaking in public areas
- Micromobility businesses in the UK are growing, thriving and leading globally
- Fewer car journeys are being taken where they could be completed by micromobility, improving traffic congestion

Consultations

A consultation inbox was created to receive feedback on the Visions document, but perhaps due to the discussions with industry in assembling this work, only minor additions were proposed hence this was used as introductory material for the workshops we would later run with Industry.

We then embarked on a process of building credible outline proposals for our workshops consulting with a subset of industrial partners and with special thanks to Dr Ianto Guy, Vehicle Safety and Technology Consultant, and Dr George Beard, Head of New Mobility from TRL for their support in design and delivery, and peer review of outputs from the workshops. This allowed us to create a workshop programme and design which would draw out the key questions, risks and opportunities with regards to PMVs, but without ‘leading the witness’ to an answer.



¹⁶ ET0221146ENN.en.pdf (trl.co.uk)

¹⁷ PACTS-The-safety-of-private-e-scooters-in-the-UK-Report-5.0.pdf

¹⁸ https://www.mcia.co.uk/downloads/download/189

¹⁹ APPGCW-indd-3.pdf (allparty cycling.org)

²⁰ Safe Micromobility (itf-oecd.org)

²¹ https://www.linkedin.com/posts/john-fox-963a4728_a-vision-for-micromobility-in-the-uk-activity-6867065031008243712-xc7a?utm_source=linkedin_share&utm_medium=member_desktop_web

Industry Workshops

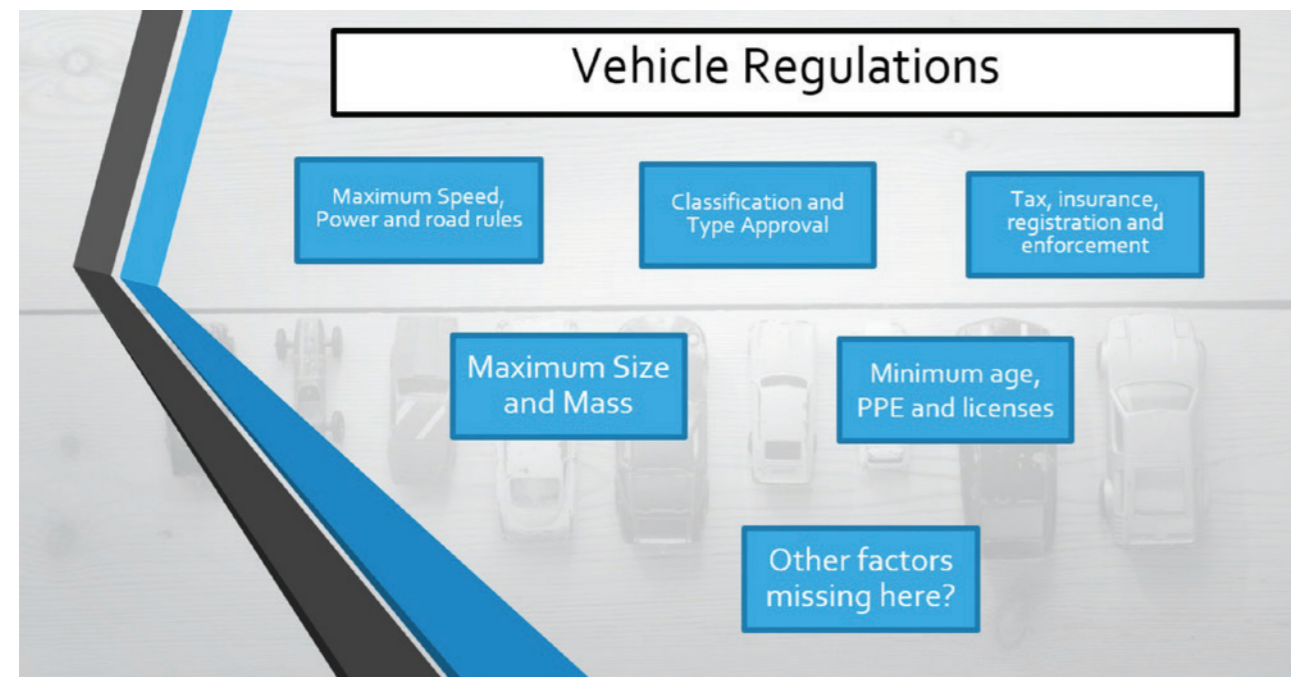
WMG worked with Cenex to promote and run a series of five industry workshops between January and March 2022. The workshops covered organisations representing User Groups, Service Providers, Logistics Companies, Vehicle developers/manufacturers, and Local & Regional Transport Authorities.

The workshops were conducted in the sequence outlined above, to ensure users were at the start of the work and their needs could be fed into later workshops, with Local Authorities last to hear everything that had been proposed.

The material and agenda for each workshop was the same; a 20-minute introductory presentation to set the scene, and two workshops breakout sessions of ~45 minutes exploring 1) detailed vehicle regulations and 2) opportunities to encourage wider adoption of lightweight vehicles over cars and vans.

Figure 4 shows an example of the topic areas covered in session one, and Figure 5 an example of the provocation material used to spark discussion for one of the topic areas.

Figure 4 - Topics for Discussion in Breakout Session One



Groups used Miro²² boards to record their comments (see Figure 6 for example) along with their name, though no comments are attributed after the workshops for confidentiality reasons. There was not sufficient time to cover every topic, hence participants were also given one-week post-workshop to add further comments and detail.

Breakout groups were between four and seven participants, and each workshop's total attendee count was between 14 (logistics companies) and 28 (manufacturers) with a total of over 100 organisations attending the workshops in total.

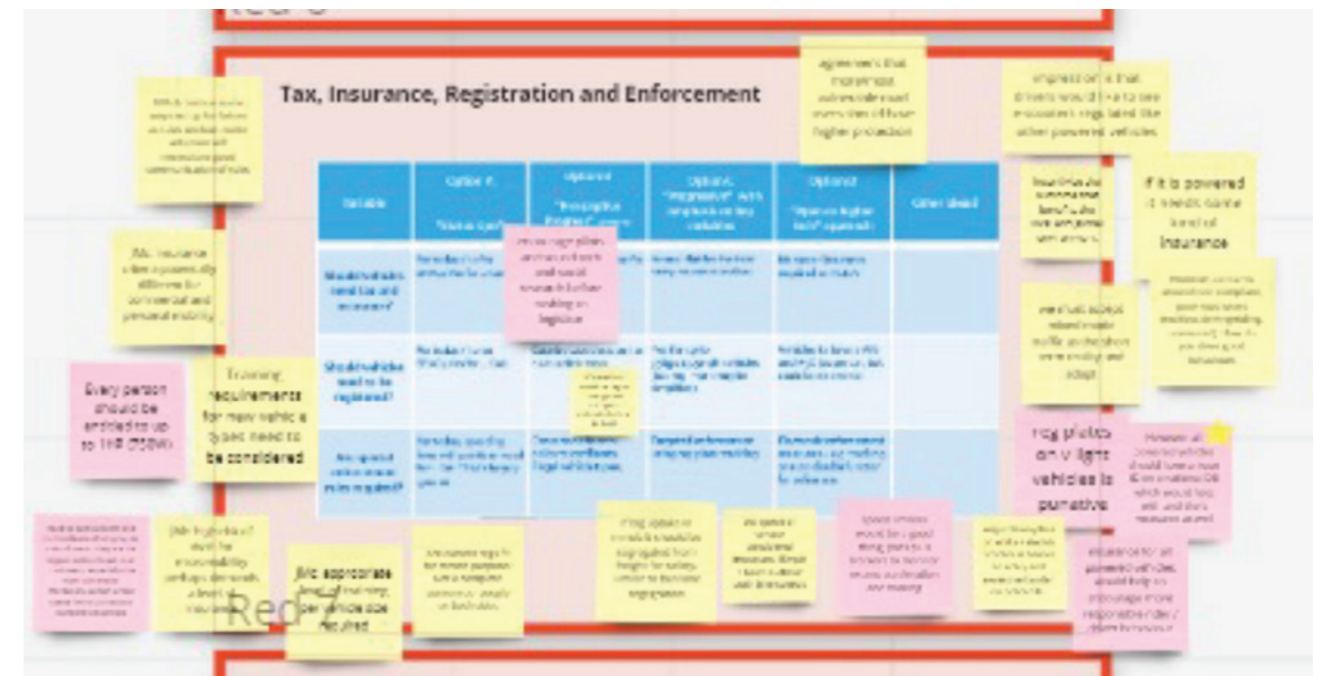
One week after each workshop (after the boards had been locked to participants), post processing took place where all groups' comments were clustered by theme/topic, and summary overarching notes were made - noting where there was agreement or disagreement, with reasons why (see Figure 7 for example).

Once the final workshop had been processed, a board colour-coding for each workshop was created and all summary comments across all workshops were collated in a similar manner to before (see Figure 8). This created a clear visualisation of where there was alignment across groups, and where perspectives differed.

Figure 5 - An example of the provocation material - here for 'Tax, Insurance and Enforcement'

Variable	Option A "Status Quo"	Option B "Prescriptive Progress" (similar to EPACs)	Option C "Progressive" with emphasis on key variables	Option D "Open or higher-tech" approach	Other ideas?
Should vehicles need tax and insurance?	Per today (No for EPACs/Yes for L-Cat)	Case by case decision for new vehicle types	Annual flat fee for third party insurance and tax	No tax or insurance required on PLEVs	
Should vehicles need to be registered?	Per today (No for EPACs/Yes for L-Cat)	Case by case decision for new vehicle types	Yes for up to 35kgs/15.5mph vehicles (but reg. mark may be simplified)	Vehicles to have a VIN and V5C (as per car, but could be electronic)	
Are special enforcement rules required?	Per today; speeding fines with points on-road for L Cat, EPACs largely ignored	Concerted effort for police to confiscate illegal vehicle types.	Targeted enforcement using reg plate tracking	Electronic enforcement measures - e.g. tracking or auto-disable function for police use.	

Figure 6 - An example of one slide of unsorted workshop output - there were up to 60 of these per workshop. (Note: resolution deliberately lowered to keep inputs anonymous)



²² <https://miro.com/index/>

Figure 7 - An example of sorted workshop feedback - each workshop producing 12 of these. (Note: resolution deliberately lowered to keep inputs anonymous)

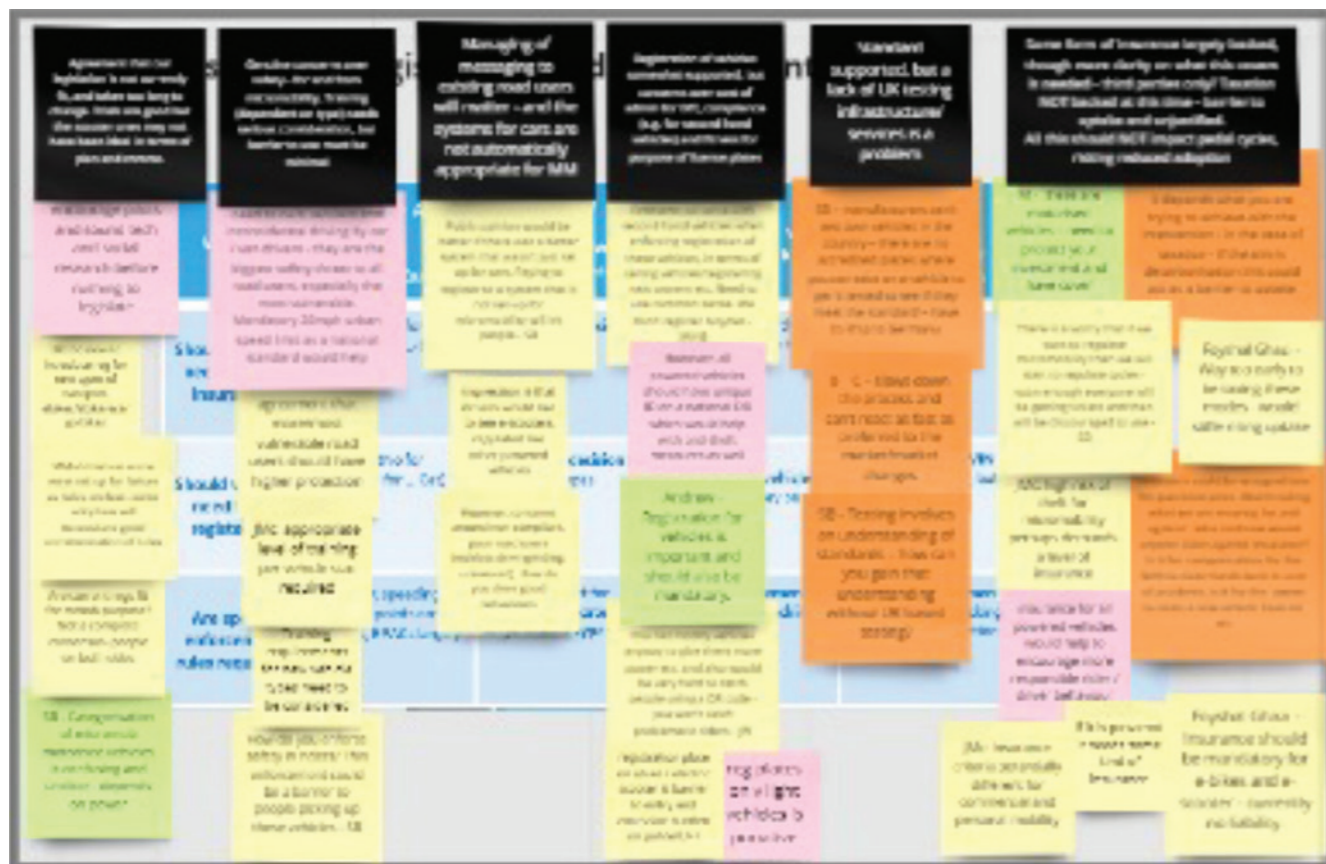
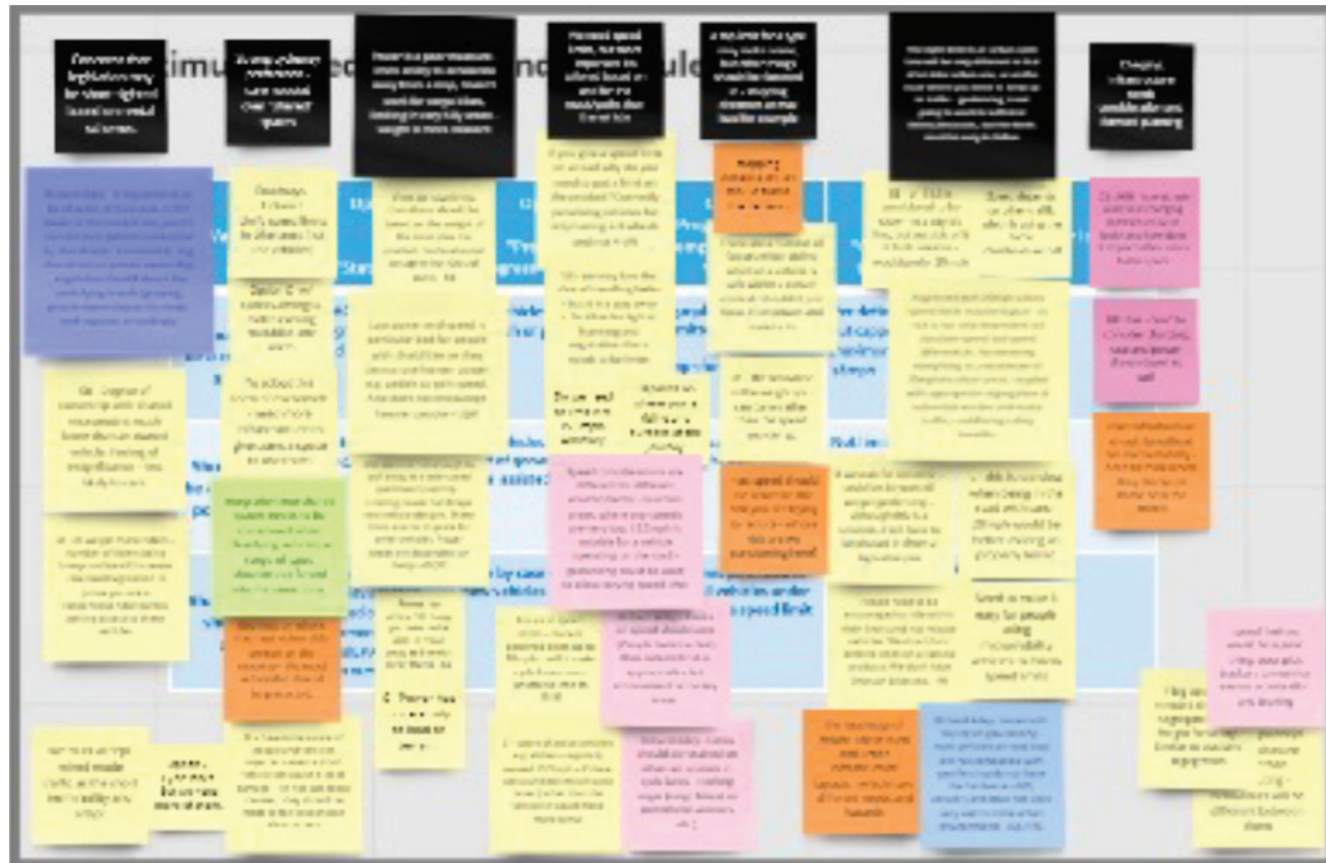
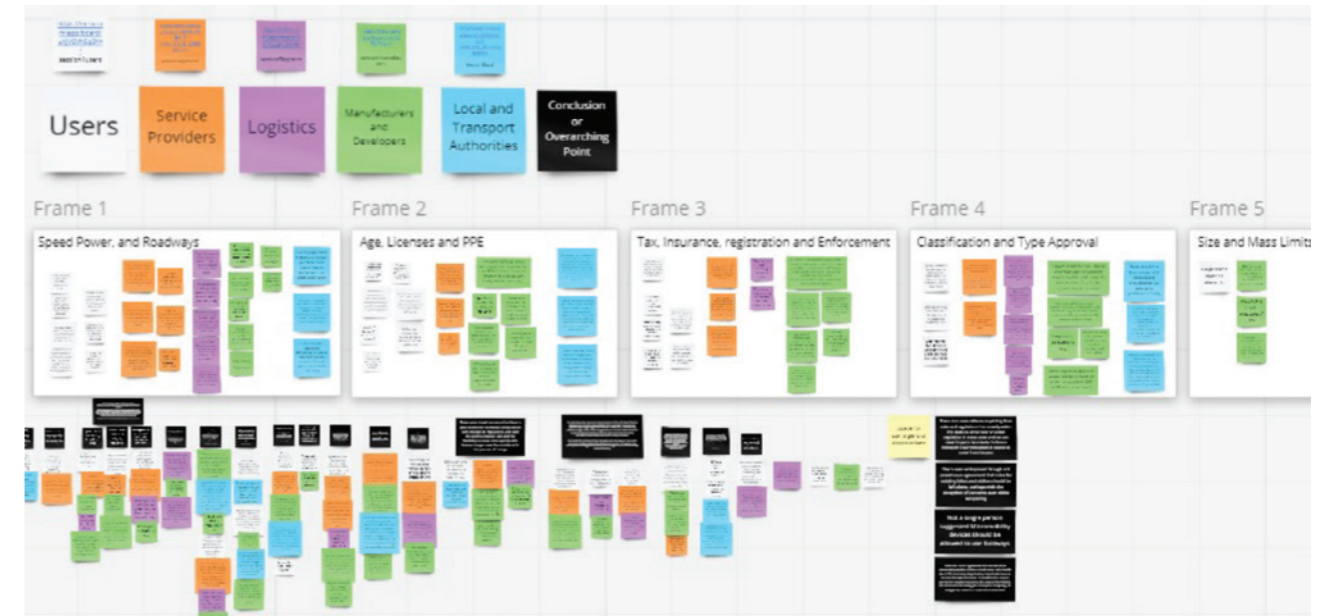


Figure 8 - Screen grab of the area used to collate all workshop inputs (around half of the total areas shown here)



Roadmap Development

Following collation and processing of the workshop material, a strategy for change and set of proposals for the first new vehicle types were produced. The proposals walk a path through the workshops content, which clearly highlighted the key message that one size does not fit all with regards to regulations for PMVs. By proposing differing rules for each suggested PMV variant, it was possible to create a framework which crosses very few red lines from the workshops. Where this is the case (e.g. the 15.5mph top speed Vs. the 12.5mph proposal for scooters), this has been highlighted and justification for the decision provided.

The proposals were shared for refinement with a small group of industry partners, and provided to DfT organisations for early-sight in order for them to raise any major issue with regards to the recommendations we would make - after all, a roadmap which is legalistically or logistically impossible to deliver is of no use to anybody.

After a month of discussions and consultation with these groups, the document you are reading now was produced alongside a bite-sized version with less detail for a faster but clear overview of the work.

The findings and proposals will be discussed further at WMG's "Micromobility UK" event on June 9th - registrations are still open at time of publication: [Micromobility UK Event 2022 \(warwick.ac.uk\)](https://www.warwick.ac.uk/micromobilityuk)



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