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THE SAFE FUNCTION FOR ROAD-GOING MICRO-MOBILITY



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¹ Image produced by S Kendall for CITA

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DOCUMENT PURPOSE

We want to set out user-focused safety statements that enable CITA² Europe to steer the direction of the whole micro-mobility vehicle ecosystem³. By using the independent⁴ remit & knowledge of CITA members to focus on whole life vehicle compliance, encompassing both vehicle type approvals (VTA) and periodic technical inspection (PTI) functions.

CITA remains committed to collaborating closely with relevant policymakers, academia, and industry participants to ensure an efficient adaptation of VTA & PTI to ensure the effective, safe & sustainable adoption of micro-mobility.

However, we acknowledge that delivering a comprehensive, consumable, and safe micro-mobility service, business model and safe integration within existing transport and mobility infrastructure⁵ will require more than safe, maintainable, and reliable conveyance.

We also acknowledge CITA recommendations and guidelines for best practices developed under CITA working groups that encourage standardization and the previous CITA micro-mobility position paper on ‘The inclusion of personal light electric vehicles in road traffic’⁶.

This will require sensible participation of all relevant stakeholders that play a role in shaping today's mobility services including municipalities, vehicle manufacturers, road users and consumers to create a safe, shared, and sound environment that minimises injury opportunities whilst maximising mobility capabilities for all.

² [CITA International Motor Vehicle Inspection Committee \(citainsp.org\)](https://citainsp.org)

³ [Micromobility for Europe \(MMfE\)](#)

⁴ [About Us – CITA International Motor Vehicle Inspection Committee \(citainsp.org\)](#)

⁵ [Cycle infrastructure design \(LTN 1/20\) - GOV.UK \(www.gov.uk\)](#)

⁶ [CITA Position-Micromobility.pdf \(citainsp.org\)](#)

EXEC SUMMARY

CITA⁷ is a multi-national, not-for-profit organisation that is focused on making roads safer and cleaner, every day, everywhere, impartially, and responsibly. We believe that sustainable mobility makes the world better. While dedicated to improving road safety and protecting the environment and to developing best practices on mandatory vehicle compliance activities, we are the impartial partner to enable progress.

The regional focus of this document is Europe. While regional specifics in other parts of the world need to be considered, we hope that our findings can help initiate & drive forward broader global discussions. Although we acknowledge that others will reach different regional conclusions, based on localised factors and norms will be achieved.

Micro-mobility is the fastest-growing mobility form⁸. This rapid evolution provides opportunities⁹ & threats to conveyance specifications¹⁰, safe integration and consumer knowledge.

Micro-mobility remains inconsistently defined at a personal, local, national, or global level. And CITA believes there are unapproved for the road conveyances that for reasons of reducing consumer risk through integration with existing road traffic & infrastructure should currently remain excluded until further research is available.

We acknowledge and encourage a more responsible, efficient, and cost-effective approach to conveyance production that would enable safe integration¹¹ where possible and exclusion where not.

The boundaries of safe integration will continue to shift as designs improve, use cases expand & infrastructure changes. Furthermore, vehicles today and in the future must not only be safe but also secure and more sustainable. Software must be tamper-proof and remain resistant to manipulation. Ideally, safety and security should be achieved without stifling safe conveyance design and driven by evidence and capability.

⁷ [About Us – CITA International Motor Vehicle Inspection Committee \(citainsp.org\)](https://citainsp.org)

⁸ [Maximizing Micromobility - Institute for Transportation and Development Policy \(itdp.org\)](https://itdp.org)

⁹ [E-Bikes Safety Standards in the European Union: An Overview \(compliancegate.com\)](https://compliancegate.com)

¹⁰ [The Netherlands and Light Electric Vehicles \(LEVs\) | Publication | Government.nl](https://government.nl)

¹¹ [Micromobility transitions from disruptive concept to core mobility offering | Automotive World](https://AutomotiveWorld.com)

CITA is keen to see the continuous improvement trend of safe, sustainable, and standardised conveyance design continue, be incentivised and accelerated. To improve safe integration, enable informed take-up and facilitate a more informed consumer choice.

WHAT IS MICRO-MOBILITY?

The question is almost as long-standing¹² as some of the forms themselves.



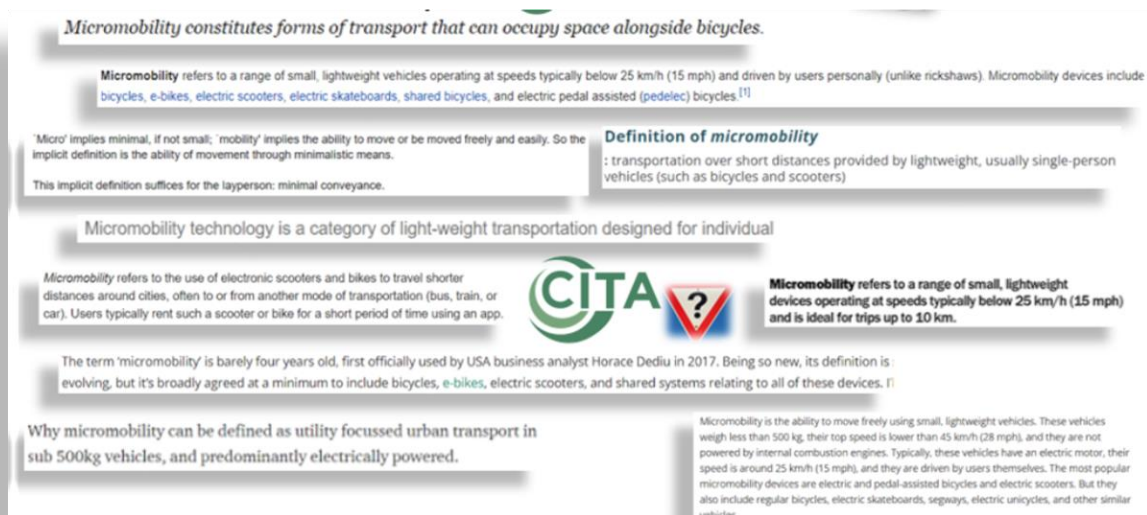
But unlike much of our existing road-going mobility and logistics sector, it is at best inconsistently defined and at worst undefined, whether that is at a personal, local, national, or global level.

Many attempts have been made by user groups, manufacturers and international organisations including SAE¹³. But even these don't align. Consensus in and across groups is required to make efficient progress¹⁴.

¹² [File: Lady Florence Norman.jpg - Wikimedia Commons](#)

¹³ [SAE Mobilus J3194 201911 Taxonomy and Classification of Powered Micromobility Vehicles](#)

¹⁴ [Micromobility for Europe \(MMfE\)](#)



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However, there are common themes. We can think about generalised terms e.g., smallish, relatively lightweight, relatively low speed, personal conveyances, that are not categorised in the Regulation EU 168/2013 and UNECE vehicle approvals regulations or recognised as competitors to pedestrian or cyclist traffic etc.

In existing vehicle categories, we differentiate one category from another by using parameters including the number of wheels, physical size, mass and capacity, burden (e.g., people or cargo), maximum velocity etc.

But micro-mobility is the fastest-growing mobility form. This is driven by the growing societal recognition of environmental impacts including urban space utilisation, air quality challenges and mobility journey costs. This rapid evolution provides opportunities¹⁶ & challenges with conveyance specifications¹⁷, safe integration and a good machine user interface. All these are essential to safe, secure, and continuous operation.

¹⁵ Image produce by S. Kendall from publically available material

¹⁶ [Maximizing Micromobility - Institute for Transportation and Development Policy \(itdp.org\)](https://www.itdp.org/)

¹⁷ [E-Bikes Safety Standards in the European Union: An Overview \(compliancegate.com\)](https://www.compliancegate.com/)

THE CITA MICRO-MOBILITY WORKING DEFINITION

Our working definition is this:

To CITA, the term micro-mobility encompasses all road-going powered and power-assisted conveyances capable of carrying goods, people or a combination that have direct human control, are not defined in existing vehicle categories, with a max mass in running order limit of 325 kg, a maximum design speed of 25 km/h, that is powered by electric, with dimensions that ensure it can fit within (but are not limited to) cycle lane infrastructure.

However, it should be noted, according to the Transport Research Laboratory ¹⁸ micro-mobility encompasses a wide variety of conveyance. They utilise the following examples



Figure 1: Standing (L)¹ and a seated e-scooter (R)²



Figure 2: An EPAC (L)³ and a type approved cycle designed to pedal in L1e-B (R)⁴



Figure 3: An electrically assisted cargo bicycle⁵



Figure 4: Self balancing personal transporters (L)⁶ and a 'hoverboard' (R)⁷



Figure 5: Electric unicycles^{8,9}



Figure 6: An electric skateboard (L)¹⁰ and a 'one-wheel' board (R)¹¹

And we believe there are conveyances that for reasons of reducing high-risk integration with existing road traffic & infrastructure¹⁹ should currently be excluded. For example, those without a physical connection between the operator and the braking and steering functions i.e., monocycles, balance boards and those controlled by wireless or wired remote control devices.

¹⁸ [Study on market development and related road safety risks for L-category vehicles and new personal mobility devices - Publications Office of the EU \(europa.eu\)](https://publications.ec.europa.eu/publication-detail/-/publication/11111111-1111-1111-1111-111111111111/language-en/format-PDF/presentation-1)

¹⁹ <https://www.government.nl/binaries/government/documents/publications/2021/05/10/the-netherlands-and-light-electric-vehicles-levs/miw+netherlands+and+light+electric+vehicles.pdf>



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Therefore, the description above stands when applied to the subset and we will refer to these as road capable micro-mobility (RCMM).

A SAFE, GREEN, GLOBAL CHALLENGE

Being electric, small²¹, lightweight and shared still isn't enough to make them a green²² mode of urban transport. Green mobility in the future heavily depends also on the components used for manufacturing, production conditions and deployment options both from an environmental and social perspective. While the pandemic exposed vulnerable global supply chains, the EU Commission proposed a supply chain law aiming to protect workers' rights from around the world. If the RCMM can't last the journey or have a reasonable life span &/or are not supported by repair components, facilities, and knowledge, it could become a burden to future sustainable mobility.

CITA are keen to see the continuous improvement trend of conveyance design continue, be incentivised and accelerated to improve safe integration, improve take-up, and enable informed consumer choice.

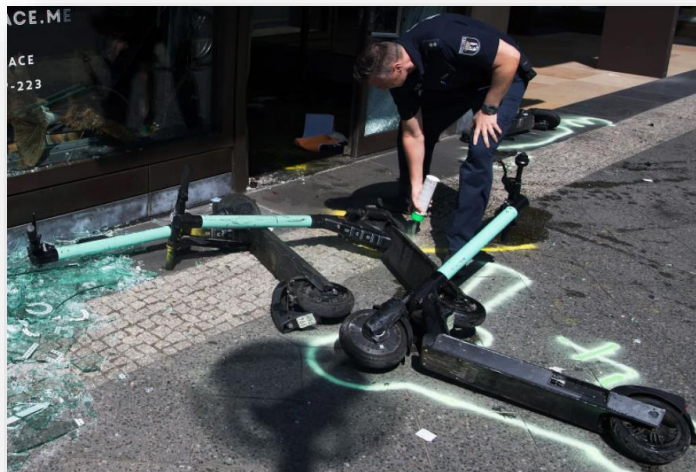
²⁰ [Metropolitan police officer's leg is broken when an e-scooter rider, crashes into him during an official blitz on the illegal vehicles \(nowmynews.blogspot.com\)](#)

²¹ [TRL Why we need to think smaller](#)

²² [The European Commission Sustainable and Smart Mobility Strategy' together with an Action Plan specifically vision 36 38 plus, action 22](#)



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The micro-mobility market remains embryonic however, CITA remains focused on retaining the viability of these conveyances throughout their deployment lifetime and to safe disposal.

CITA feel it is an ineffective, unrealistic, and short-sighted defence to suggest that all existing infrastructure, vehicles, and driver/riders/pedestrians must rapidly change to accommodate the safe deployment of this road-going, inter-modal conveyances²⁵.

²³ [*Nottingham Post - Clifton woman says 'dangerous' scooter snapped in half as she rode it - Nottinghamshire Live*](#)

²⁴ [*https://www.wired.co.uk/article/escooters-accidents-europe*](https://www.wired.co.uk/article/escooters-accidents-europe)

²⁵ [*Research4Committees Sustainable and smart urban transport*](#)

CITA (and others) acknowledge this as an important growth market, reports 25 suggest that Europe could be worth ~\$100-150 billion by 2030²⁶. However, safe integration for all should not be sacrificed on the altar of accelerated growth for the few. A more responsible, efficient, and cost-effective approach to conveyance production would be to enable safe integration²⁷ where possible and exclusion where not. The boundaries of this approach will continue to shift as designs improve, use cases expand & infrastructure improves. Ideally, this should be achieved by enabling and incentivising safe conveyance by design.

We recognise and celebrate the place for safe micro-mobility in assisting to meet the de-carbonisation of transport agenda²⁸, support social levelling²⁹ and fill a gap within the existing mobility and logistics ecosystem. But again, the approved solutions must meet those aims and not just transfer or defer their impacts.

WHY WE HAVE NOT JUMPED STRAIGHT TO TECHNICAL STANDARDS

These conveyances continue to challenge the current mindset of academia, industry, and governments about what a vehicle is, how it's constructed and the balance of safe supply & operation over design and consumer freedoms.

This is amplified by the currently unregulated micro-mobility market in many European countries today, and the variety of adoption rates for current vehicle categories most notably Cat-L.

Vehicle capabilities continue to develop fast, driven by data analytics that influences machine interface improvements, safety³⁰ by design characteristics & service changes.

²⁶ [Estimated micromobility market size in 2030, by key region and scenario](#)

²⁷ [Micromobility transitions from disruptive concept to core mobility offering | Automotive World](#)

²⁸ [Decarbonisation | TRIMIS \(europa.eu\)](#)

²⁹ [Accessibility to places and transport: social, economic, and environmental interactions | TRIMIS \(europa.eu\)](#)

³⁰ [E-scooters-Safety-Statement-100720-.docx.pdf \(como.org.uk\)](#)

SOME WORKING ASSUMPTIONS

In bringing together our user-focused safety statements we've considered and listed an array of working assumptions see [Annex C](#) for a non-exhaustive list. We highlight a few of the key ones.

- One size of conveyance does not fit ³¹all
- Equitable access design is one key to consumer safety
- These are currently inconsistently defined conveyances but exist outside of the current vehicle categories³²
- They operate within an embryonic ecosystem but exist and could integrate safely within current mobility and logistic infrastructure, providing defined minimal safety & security standards are (and remain) met³³
- Their size permits use on all areas not designated as pavements³⁴ and some are intermodal enabled
- They are a relatively cheap mobility solution to purchase new and operate, compared to most other personal mobility options
- As 'micro' they occupy less space than other individually occupied mobility options (while driving & parking), which will be increasingly important for dense urban areas
- The life cycle is normally less than other transport modes

³¹ [*Department for Transport The Highway Code Annex 1 You and your bicycle*](#)

³² [*Vehicle categories \(europa.eu\)*](#)

³³ [*Why micromobility is here to stay | McKinsey*](#)

³⁴ [*Tier's inaugural Safety board report*](#)

OUR SCOPE

In Scope	Out of Scope
<ul style="list-style-type: none">• The conveyances’ mechanical, electrical/digital and structural components together with the test equipment and examiner knowledge required to inform future Approval and/or Periodic Technical Inspection functions and promote the consistent, safe, and effective deployment of road compliant micro-mobility (RCMM) conveyances.	<ul style="list-style-type: none">• MaaS and other operator platforms• Personal Protective Equipment (PPE)• Costs and business model assessment• Economic benefit calculations• Automated conveyances i.e., Low-Speed Automated Devices (LSAD)• Maintenance equipment design

WHAT IS SAFE ENOUGH FOR A MICRO-MOBILITY CONVEYANCE?

We believe that the aim should be that if.

“A reasonably competent adult, with minimal experience or training, can safely use a lightweight, small, mechanically propelled conveyance (not encompassed in Regulation EU 168/2013³⁵ or other) to transport themselves, passengers &/or goods within a dynamic, blended, urban traffic environment in all but the most severe weather conditions than that could be considered safe enough by design.”

Then we may have a road-complaint micro-mobility (RCMM) vehicle.

³⁵ [Regulation \(EU\) No 168/2013 of the European Parliament and of the Council of 15 January 2013 on the approval and market surveillance of two- or three-wheel vehicles and quadricycles \(Text with EEA relevance\) - Publications Office of the EU \(europa.eu\)](#)

To achieve that in engineering terms it is likely that an RCMM has multiple subcategories but in general it.

- has a maximum³⁶ mass in running order³⁷ limit of 325 kg³⁸,
- has a maximum³⁹ design speed of ≤ 25 km/h,
- has dimensions that ensure it can fit within a variety of national cycle lane infrastructure requirements ⁴⁰
- may be capable of towing a trailer or trailed appliance within national cycle lane infrastructure.

It is also likely that the most effective means to ensure safety by design, continuous compliance and consumer protection is a form of approval⁴¹ coupled with routine monitoring of the conveyance condition.

WHAT WE'RE NOT ABLE TO DO, YET

Given some of the challenges identified above, we are not yet able to define a CITA vision and aim for these conveyances through a list of technical standards akin to those seen in Directive 2014/45/EU⁴², Directive 2014/46/EU⁴³ or Directive 2014/47/EU⁴⁴ nor the equipment, facilities and skills required to support delivery.

³⁶ *Local deployment restrictions may be lower*

³⁷ *Excluding mass of traction batteries*

³⁸ *This retains micro-mobility between the maximum permitted masses of EU No 168/2013 for L2e and L6e categories*

³⁹ *Local deployment restrictions may be lower*

⁴⁰ *This does not specifically rule out urban road use*

⁴¹ *E-Mobility Testing | DEKRA Expert tip*

⁴² *Directive 2014/45/EU of the European Parliament and of the Council of 3 April 2014 on periodic roadworthiness tests for motor vehicles and their trailers and repealing Directive 2009/40/EC Text with EEA relevance*

⁴³ *Directive 2014/46/EU of the European Parliament and of the Council of 3 April 2014 amending Council Directive 1999/37/EC on the registration documents for vehicles*

⁴⁴ *Directive 2014/47/EU of the European Parliament and of the Council of 3 April 2014 on the technical roadside inspection of the roadworthiness of commercial vehicles*

What we have constructed are

- **consumer-focused vehicle safety statements** (see [annex A](#)) at a systems level⁴⁵ that we believe would support the essential safety⁴⁶ goal whilst enabling manufacturers some creative freedom to build systems and conveyances that demonstrate compliance⁴⁷
- **enablers' functions** (see [annex B](#)) that could lead to the continuous safe deployment of conveyances.

OUR CURRENT SKILLS, EQUIPMENT AND FACILITIES THINKING

We believe that much of the skills required could transpose from existing skills and knowledge e.g., PTI⁴⁸ routines of Cat-L vehicles⁴⁹ and the safe inspection of electrical systems seen in other modes. However, subject to further work, other skills enhancements may also be required⁵⁰.

With facilities and equipment, again subject to further work on deciding the systems in scope, the wide variety of conveyance layout, size and mass could be a challenge for existing approval and PTI facilities, even those Cat-L equipped to EU Regulation (EU) No 168/2013⁵¹.

⁴⁶ [*The Micromobility Market – Growth, Constraints & MOBIX*](#)

⁴⁷ [*German Federal Statistical Office \(destatis.de\)*](#)

⁴⁸ [*PTI is predominantly a visual inspection supported by some equipment & basic original manufacturers data*](#)

⁴⁹ [*European Parliament Votes For Technical Inspections For All Motorcycles*](#)

⁵⁰ [*CITA Recommendation No. 18 TRAINING AND COMPETENCE*](#)

⁵¹ [*How Safe Are Micromobility Options? \(mobix.ai\)*](#)

OUTLOOK

CITA, through its dedicated Task Force, aims to continue constructive and target-oriented dialogue with relevant policymakers and key industry stakeholders to enable adaption and adoption of revised vehicle approval & continuous compliance examination processes.

We strongly believe that, for the RCMM we have scoped here, a conveyance of this capability could safely integrate with the existing mobility & logistics ecosystem within existing infrastructure, while becoming more sustainable, less prone to accidents and increasing overall levels of comfort and meeting individual mobility demands beyond borders.

This would support the ambitious sustainability and environmental targets we support while ensuring user acceptance over time. The content of this document must be regularly evaluated as knowledge, capability & acceptance continue to change in this embryonic road-going sector.

ANNEX A: CONVEYANCE SYSTEMS AND/OR COMPONENT LEVEL SAFETY STATEMENTS

We note that work is progressing within other CITA Task Forces with a focus on specific systems or functions and will continue to collaborate

System or component area	We want/need/expect ...	So that ...	We know it is done when ...
Advanced Rider Assistance	... that compact, localised and lightweight technology like ADAS (Advanced Driver Assistance Systems) in vehicles and smart limits ⁵² becomes normalised within RCMM	... similar safety gains can be achieved without the long design gestation of the current automotive sector	... this technology moves from the fringe of design & trial and into mainstream consumer expectations with demonstrable safety benefits
Anti-tampering	... that the conveyance & its safety & environmental safety-critical systems are protected from unobtrusive, unauthorised access	... tampering is discouraged & if tampering occurred it should be obvious to the untrained eye and ensure continued safe deployment or where necessary prevent further use	... through assessment, original design parameters remain constant
Audible warning	... a system capable, on deployment, of consistently producing a warning to other road users is installed	... other road users can be made aware of the conveyances' presence	... through acoustic assessment, a controlled noise is emitted that enables directional identification through continuous and sustainable tone

⁵² *How Safe Are Micromobility Options? (mobix.ai)*

Braking (including retardation)	... the conveyance operator can decelerate and stop in a controlled and safe, manner within a reasonable distance on existing road surfaces whilst remaining positioned on/in the RCMM	...the rider can retain stability, notify road users of the braking action, decelerate, stop & retain stationary wheels after a triggering event	... this can be repeatedly and progressively demonstrated through successful dynamic brake efficiency tests on realistic, clean road surfaces with clear warnings to the rear of the conveyance for other road users
Electrical safety and compatibility	... that the battery, electrical systems components, and conveyance charging coupling are, labelled, intrinsic, EMC and user safe riders remain safe in all weather conditions & are warned of any electrical safety failures that may place them at risk	... thorough inspection and testing of all electrical components & their installation for suitable markings, safety, and compatibility with the intended operation & are weatherproof
Headlamps	... that the headlamp can effectively illuminate the road surface ahead without dazzling other road users	... the rider can make effective decisions about a safe route, understand their environment under poor ambient lighting conditions and other road users have an earlier awareness of an approaching vehicle	... a common standard is adopted that specifies the pattern and intensity of light emitted which serves to illuminate the way ahead without causing oncoming traffic to be dazzled
Indication of intended travel	... the rider can safely and effectively warn other road users of a change to their intended direction of travel	... other road users can be made aware of the intended directional change, to reduce the inherent risk	... when without loss of steering/braking control or stability a user can safely indicate to other road users their intentions
Injury	... that, by design, protection is afforded from avoidable entrapment, entanglement, impact, or obstruction injury ⁵³⁵⁴	... everyone is protected from avoidable injury during normal operation, and damage from a collision is reduced	... by demonstrating & examining the design, finish & materials used

⁵³ *The dynamics of motorcycle crashes – Road Safety Knowledge Centre*

⁵⁴ *2,155 personal injury accidents with e-scooters in 2020 - German Federal Statistical Office (destatis.de)*

Load (cargo) area/security	...that where fitted, this space is of sufficient strength to support the maximum imposed load specified, throughout the area and provides mechanisms to securely retain the load within the conveyance & any aperture opening	... the load is supported, unable to move under normal conveyance operation and/or distract the operator	... through structural evidence and assessment, the maximum imposed loads can be retained
Operator controls	... controls are intuitive, equitable and default to a safe position	... users are encouraged, by design, to safely interact with and operate these conveyances	... through evidence and examination of safety-critical control components that safety systems & stability are controllable, proportional & safe
Performance	... the road-going performance of the conveyance enables safe, stable, and graduated acceleration	... the rider retains full control of the machine through to maximum performance and is aware of reaching maximum permitted speeds and/or assistance cut off	... through evidence and assessment of the performance characteristics of the conveyance
Position lamps and retro-reflectors	... that the lighting and reflectors enable the presence and dimensions to be effectively marked, are controllable and are easily operated	... through fixed, automatic, or permanent on lighting installation, sufficient and safe indication of machine presence is provided to other road users	... thorough physical assessment of the capability, security and fittings permanently installed
Rider, passenger contact surfaces	... that all features and users' control surfaces provide a comfortable, tactile, and durable interface with the conveyance	... the safe and comfortable control is retained across the whole vehicle operating cycle and in all-weather environments	... thorough assessment of all control surfaces contactable by the user(s) during normal operation promote comfort, capability & durability

Roadwheels	... that roadwheels enhance the conveyance steering, braking and stability forces	... efficient and effective operation is maintained across a variety of road surfaces, in all operating weather conditions	... through evidence and assessment of the materials, fitment and geometry that safe & durable design is evident
Sound vehicle alerting system (AVAS)	... that appropriate warning during low-speed operation is available to warn road users of the conveyance's presence	... those with impaired or obstructed vision are made aware of a conveyance in the locality and its direction of approach	... through acoustic assessment, the noise emitted enables identification & travel directional without unnecessary or unpleasant auditory intrusion
Steering	... the rider can provide proportionate, and direct input that leads to an immediate vehicle response and a safe, controlled, and proportionate change in vehicle direction capability	... does not destabilise the rider's ability to remain on the machine whilst effectively changing direction without resistance	... the rider's input can be effectively transferred to the conveyance with controlled outcomes across the range of operational speeds
Structural integrity and durability	... structural integrity, is commensurate with the vehicle's maximum performance characteristics and is durable by design ⁵⁵	... with reasonable maintenance, the conveyance is available to deliver safe operation, over a prolonged period of real-world deployment and any failings are self-evident via rider feedback, warning systems or through simple visual inspection	... through documentary assessment and physical inspection, the structural integrity, performance & durability is evident
Suspension	... that in normal operation, the road wheel(s) remain in contact with all road surfaces across the full range of designed road speeds & load parameters	... to minimise the negative impact on the rider/load, maintain vehicle stability & support safe deployment within existing built infrastructure and reduce opportunities for damage	... through demonstration the RCMM remains stable, the load and rider secure and without causing damage, whilst operating across a range of design speeds & loads

⁵⁵ *Playing by the rules Report on e-scooter operators and fleets in cities - a survey of city approaches and options to optimise regulations*

Tyres	... that the durable tyre retains a level of friction commensurate with the vehicle braking, steering, suspension, and maximum mass demands on a variety of operational road surfaces, always remains seated on the wheel rim	... vehicle lateral and directional stability is retained without causing avoidable damage to the vehicle, road surface or other structures (e.g., intermodal transporting vehicle)	... through assessment of the tyre assembly and documentary evidence of the structure & characteristics of the tyre, we are convinced that these capabilities are met
Unauthorised use	... ensure that the theft ⁵⁶ or unauthorised use ⁵⁷ of a conveyance is discouraged & as obvious to the rightful owner/operator/investigator as possible	... there is an inherent deterrent in attempting to use/steal, active discouragement & an evidence trail of attempt	... features are available that discourage nefarious opportunity, engage owners because of an attempted theft &/or alert the keeper to an attempt
Unsafe Use	... that technology detects, reports, and incentivises correction in dangerous and/or inconsiderate riding, parking, or manoeuvring ⁵⁸	... society can maximise the benefits without transferring the risk from one user to another through delays in implementing existing safety technologies	... these systems are subject to examination and testing and these capabilities are communicated as part of the RCMMs' safety score(s)
User information	... the operator is aware of all safety-critical component states and performance, via a user friendly, vehicle-based display in all operating weather conditions, without undue distraction	... at all operating times, the user is aware of their vehicle condition, receives advanced warning of safety-critical component failures and can make informed decisions based on that evidence	... through assessment of the dashboard, the status of critical components is self-evident

⁵⁷ [*Electric Scootering How Do Electric Scooters not get Stolen? How to Protect Yours*](#)

⁵⁷ [*EbikeSchool.com 10 Ways to Make Your Ebike More Theft Resistant*](#)

⁵⁸ [*Playing by the rules Report on e-scooter operators and fleets in cities - a survey of city approaches and options to optimise regulations*](#)

Vehicle Identification & conformity plate	... that each unique RCMM is permanently, consistently, and visually identifiable through simple inspection of a known location on the RCMM	... identification, traceability, and security are enhanced, and duplication, confusion and nefarious acts are discouraged throughout the RCMM's lifetime	... through examination & evidence of a legible, tamperproof, and durable identifier in a known location on the RCMM
View	... that an adequate all-around view is always retained for the user, even when operating from behind a screen	... adequate rider vision, commensurate with the vehicle's performance is always maintained	... through installation and performance assessment the rider retains a view of their environment

ANNEX B: CONVEYANCE SUPPORT SYSTEMS OR FUNCTION SAFETY STATEMENTS

System or component area	We want/need/expect ...	So that ...	We know it is done when ...
Conveyance Safety Rating	... conveyances are consistently assessed against industry best practices ⁵⁹ and best in class	... consumers can make informed decisions regarding a vehicle's performance, safety, and environmental impacts	... there is evidence of an independently produced, transparent, public 'league table' supported by repeatable, practical assessments
Data/information	... support for the provision of user data ⁶⁰ and information that leads were necessary to intervention, regarding the conveyance condition, safe operation, and maintenance	... users & purchasers are aware of any risks sensed by the conveyance, how close they are to the safe design envelope and/or operating the domain through intelligible, transparent & focused information affording & incentivising a modification in their behaviours	... consistent & accurate information for condition, operation and maintenance are published. And users can view their performance, make informed decisions & modify their behaviours and/or vehicle capability
Ecosystem	... that conveyances can safely operate across the existing road infrastructure, in a wide variety of weather and traffic conditions	... safe conveyance use is maximised whilst minimising the risks to operators, other road users and infrastructure through RCMM operation	... though the holistic assessment of the conveyance, in conjunction with other attributes (outside of CITAs remit), the conclusion is these can be safely operated with minimal risk and without damage to the conveyance, users, other road users or infrastructure

⁵⁹ [E-Mobility Testing | DEKRA Expert tip](#)

⁶⁰ [How Safe Are Micromobility Options? \(mobix.ai\)](#)

Product Support	... that sufficient, knowledge, information and spare components remain available to incentivise the continued safe deployment of an RCMM	... consumers are encouraged to quickly & easily rectify defects ⁶¹ , protect the environment and able to retain the conveyance in safe circulation for a considerable period, even after production stops	... sustainable business models are in place that goes beyond merely supplying the conveyance & offer an opportunity for prolonged safe use
Recycling/re-engineered	... that these conveyances are capable of being upcycled, re-cycled or safely scrapped at the end of effective service through a traceable, recognised, and authorised route	... repair, reuse, and recycling opportunities are maximised, environmental impact minimised and continued economic deployment encouraged	... when suitable national schemes are readily available to consumers & this forms part of a consumer environmental mark
Repair	... that sufficient, clear knowledge and parts remain available during sales and for a period beyond the end of production	... consumers are encouraged to maximise the life cycle of these conveyances through effective repair	... evidence is available of continuous knowledge and parts supply that encourages safe, effective, and efficient repair across the conveyance's lifetime
Safety and environmental rating	... and would support a published conveyance safety rating system	... consumers can make smart, informed and evidence-based decisions based on their requirements set against a standard safety, environmental and cost framework	... there are at least national safety and environmental league tables publish using a consistent set of criteria
Safety Recalls	... that road-going conveyances can be traced, recalled, and rectified (where necessary) before returning safely to service	... consumers retain confidence, manufacturers retain responsibility and regulators are empowered to incentivise corrective outcomes for continued safe deployment	... legal mechanisms are enabled, enacted, and utilised for the benefit of road safety, environmental protection &/or consumer protection
Test Mode	... that, where necessary, the conveyance can easily, effectively & transparently be temporarily put into a 'test mode' without changing its performance characteristics	... examinations & assessments of complex & interlinked systems can be achieved, when required, & be assessed on their merits	... through published instructions and access, individual systems &/or components can be safely & consistently examined

⁶¹ We expect that defect severity would broadly align with the other CITA Taskforce thinking for example those in the *Electric Vehicle & the Road Worthiness Package* task forces

ANNEX C: WORKING ASSUMPTIONS (NONE-EXHAUSTIVE) LIST

This is a non-definitive list of some of our assumptions brigaded under four key headings.

USER

- a. One size does not fit all ⁶²



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- b. Require inter and mixed modal capability
- c. Age-restricted to adults i.e., 14+years
- d. Variable ability will challenge the limited adjustments (e.g., vision, hearing balance, height, reach)
- e. There is gender disparity in micro-mobility usage⁶⁴

⁶² *Department for Transport the Highway Code Annex 1 You and your bicycle*

⁶³ *Social Impact Architects Equity v Equality by Suzanne Smith*

⁶⁴ *In-Depth Focus: On-Demand & Shared Mobility (intelligenttransport.com)*

CONVEYANCE

- a. These are currently inconsistently defined products but are outside of the existing Cat-L definitions
- b. They are rapidly developing, mechanical, electric, and sometimes shared use conveyances with a variety of digital and connected capabilities
- c. They are relatively cheap to purchase, store and operate compared to most other personal mobility options
- d. They are a compact and relatively lightweight design, with some suitable for inter-modal travel
- e. They have simple hand controls and a broad variety of 'dashboard' information
- f. Maximum design speed restricted ~25km/h
- g. Can employ novel technical, digital, and cyber capabilities
- h. Are not restricted to utilising automotive parts
- i. Can be/or are designed for sustainable⁶⁵ deployment as an RCMM
- j. Likely to be electric propulsion by default but could also be assisted
- k. Visibility is key to safety, to see and be seen is essential, requiring head, marker, and brake lights
- l. Signalling intent to other road users leads to better understanding and reduced risk, so the capability to signal to others is essential
- m. weather protection of all components and features is essential to promoting long operating lifespans, safe operation, and rider comfort
- n. an RCMM could be allowed on pedestrian spaces with a Vulnerable Road Uses present, like mobility scooters
- o. By design, they must minimise impact injuries to users and/or other road users
- p. By design, crash mitigation⁶⁶ needs to mitigate crashes involving
 - a. micro-mobility on vehicles⁶⁷,
 - b. micro-mobility on micro-mobility (MM2MM),
 - c. micro-mobility on Vulnerable Road User (MM2VRU), and
 - d. micro-mobility with infrastructure (MM2X)
- q. Standing vs sitting, goods vs passenger, speed, mass, and wheel platform & RCMM size all impact the minimum stability, safety and technology features required
- r. Their design enables use on everything except pavements⁶⁸ aka lane width, turns, crossings and gateways for the country of intended operation⁶⁹

⁶⁵ [*Efficient and Green Mobility \(europa.eu\)*](#)

⁶⁶ [*Autoliv performs a first crash test of an e-scooter airbag*](#)

⁶⁷ [*Scooter Crash Test - YouTube*](#)

⁶⁸ [*Tier's inaugural Safety board report*](#)

⁶⁹ [*The London Cycling Design Standards*](#)

ENVIRONMENT

- s. It is intended to operate them on existing, shared⁷⁰ on-road infrastructure mainly within local, permissive urbanised areas
- t. CITA does not directly control or influence the other actors or their development timelines (including infrastructure) or the operating environment only the ergo vehicle design
- u. Safe handling of existing road surfaces and environments is essential. This includes:
 - a. tarmac, cobbles, concrete road surfaces
 - b. drop kerbs, access covers and road paint
 - c. traffic calming measures, detritus and other normally occurring features
- v. Minimum infrastructure design is more commensurate with bicycles than with Category M, N or O vehicles

BUSINESS MODEL

- w. They operate mainly within an embryonic business model that sits within an existing, defined, and prescriptive mobility and logistic infrastructure
- x. Used on relatively short journeys but could be at high frequency and with multiple users – journey data⁷² statistics
- y. Global, regional, and local appetite is variable, even within CITA Europe
- z. Spot hire, contract hire, and private ownership models will exist
- aa. International, national, and local authority appetite & enabling regulation will vary
- bb. Regulation will occur
- cc. Consolidation of businesses will continue
- dd. The consumer will be free to decide on appropriate levels of PPE, but helmet use is recommended^{73 74}
- ee. They may not be produced by recognised original equipment vehicle manufacturers

⁷⁰ [*Micromobility in London*](#)

⁷¹ [*Department for Transport The Highway Code*](#)

⁷² [*DEKRA Shared Micro-Mobility – Safe and Sustainable in Cities Whitepaper 02/21*](#)

⁷³ [*Microsoft Word - PI20-084-A \[AUTO\] DEKRA Road Safety Report Helmet-Wearing Rates \(ws\).docx*](#)

⁷⁴ [*Crash Test: When the worst comes to the worst – DEKRA Solutions – Magazine \(dekra-solutions.com\)*](#)

ANNEX D: ADDITIONAL RESEARCH REFERENCES



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1. DEKRA-DIGITAL_Whit
2. BS EN 15194:2017 – Cycles. Electrically power assisted cycles. EPAC Bicycles
3. BS 6102-2:1982 Cycles - Specification for photometric and physical requirements of reflective devices
4. BS 6102-3:1986 Cycles - Specification for photometric and physical requirements of lighting equipment
5. BS EN 14344:2004 – Child use and care articles. Child seats for cycles. Safety requirements and test methods
6. BS EN 14872:2006 (Withdrawn) – Bicycles. Accessories for bicycles. Luggage carriers
7. ETSC⁷⁵ E-Scooter deployment comparison

ANNEX E: EXISTING CITA RECOMMENDATIONS (MEMBERS ONLY) ⁷⁶

These may either be impacted or will impact the work done in micro-mobility, these and other recommendations are available to CITA members.

- Recommendation no. 1 “Inspection of Vehicles in Categories M, N and O”
- recommendation no. 2 “Vehicles carrying passengers (Categories M2 and M3)”
- Recommendation no. 4 Decisions to be taken with reference to the technical modifications carried out on vehicles in use
- Recommendation no. 5 Revision 1 Inspection of Vehicles in Category L
- Recommendation no. 7 “Inspection station equipment”
- Recommendation no. 8 “Brake Testing In Periodic Technical Inspection
- recommendation no. 9 B “Quality system for road vehicle inspection bodies under the direct supervision of a designated authority”
- Recommendation no.. 11 “Items to be inspected at the roadside, methods of inspection and principal reasons for rejection”
- Recommendation no. 19 “Anti-Fraud Measures”
- Recommendation no. 21 “Port of Entry”
- Recommendation no. 23 “Guidelines on what should lead to more detailed technical roadside inspections” (in collaboration with CORTE)
- Recommendation no. 24 Measurement Traceability In Vehicle Inspection

⁷⁵ ETSC | European Transport Safety Council

⁷⁶ Publications – CITA International Motor Vehicle Inspection Committee (citainsp.org)