Inquiry into e-mobility safety and use in Queensland

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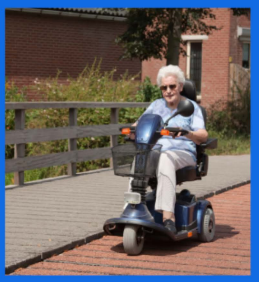
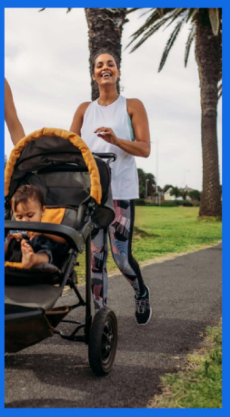
Incident Reporting for Vulnerable Road Users





Zipidi

Ride Report

Vulnerable Road Users Research Proposal

Vulnerable Road Users Research Proposal

Introduction

Vulnerable road users (VRUs) are those people killed or injured in road crashes other than drivers. While long-term road tolls have been trending down over the last 50 years, they have plateaued over the last decade at around 1,200 deaths per annum in Australia. The mix has changed in that time, with proportionally fewer drivers dying in road crashes, as cars have become safer for drivers and more dangerous to vulnerable road users[1]. While deaths have stabilised, injuries have continued to climb, imposing stress and billions of dollars of costs on Australians and their health systems.

The next significant downward shift in Australia's road crashes impacts for both deaths and injuries will require significant reductions in crashes involving vulnerable road users.

To achieve this reduction, programs must be urgently undertaken to understand and address the root causes of such crashes and what risk mitigants can be implemented. A common method of analysing incidents is required across all stakeholder groups in determining these solutions. Fundamental to this is creating an Open Data Specification to provide a standardised method and format of reporting, categorising and analysing incidents involving vulnerable road users.

This project will create an Open Data Specification for incidents involving vulnerable road users. It will be the first such specification in the world. The trusted brands of Australia's and the world's motoring associations will provide a springboard for this specification to be adopted globally to inform changes that will impact the global costs of road crashes in both human and financial terms.

Research Overview

Zipidi and Ride Report have commenced planning a research project to develop a common standard for incident reporting affecting vulnerable road users. This project was initiated as a result of our work with insurance, shared bike and scooter operators and Local Government Agencies due to the current poor and inconsistent reporting, which provided limited information to support a full understanding of the impact of these crashes despite strong interest in, and even requirements for, such data from all relevant parties. The lack of appropriate incident reporting is a significant issue across Australia and is an active topic with Victoria, NSW and Queensland transport departments.

It is also an active issue in New Zealand, where the Government Accident Compensation Commission has some data information on vulnerable user claims.

Zipidi and Ride Report believe a broader public/private industry approach under the AAA's RSRF will deliver a better outcome for all and propose collaborating with industry stakeholders in an RSRF-supported program.

[1] Based on BITRE Road Safety Statistics, https://www.bitre.gov.au/statistics/safety

About Zipidi and Ride Report

Zipidi specialises in risk management, strategy, insurance, regulatory advice, and technology for micromobility. Zipidi arranges insurance for rental operators and last-mile delivery businesses. Zipidi has built risk rating methodologies for micromobility and uses actual incident and claims information to iterate models.

Ride Report is the leading global platform for aggregating real-time data from shared-scooter, bike, moped and other devices. Ride Report has experience working with over 100 public agencies across four continents, ingesting hundreds of millions of shared micromobility trips, and building digital solutions for real-time and historical data analytics and insights. It works with all of the major operators in Australia and nearly all of the public agencies overseeing Australia's shared micromobility programs.

Stakeholder Groups

As part of this project, we will engage with a broad range of stakeholders across academia, Government, peak bodies, motoring associations, insurance companies and operators. Stakeholder groups we will engage with include:

- **University(ies)**: One or more Australian Universities with dedicated academic staff and teams focussed on road safety, particularly with vulnerable users - Monash, Griffith, Deakin, Sunshine Coast, Central Queensland, Sydney and other universities work actively in these areas.

- **Departments of Transport**: One or more of the DoTs working in this area. NSW, VIC and QLD are the priority States.

- **Shared Mobility Rental Operators**: Key ride operators across Australia, such as Neuron, LIme, Beam, etc. We have strong working relationships with all major operators in Australia and others worldwide.

- **Delivery Rider Organisations**: Delivery operators such as Uber Eats, Menulog, Deliveroo, etc., as there have been many incidents involving delivery riders in Australia. These organisations will be important stakeholders to be part of the project.

- **Motoring Associations**: Information from Motoring Associations is vital for the project, as they are key stakeholders and points of advocacy for any data outcomes created from the research. We have worked with motoring associations in Australia, NZ, the USA, Canada and Europe. As Australia's peak body, AAA is well-placed to promote this project to global colleagues.

- **Insurance Companies**: We work with International and Australian insurance companies for whom this topic is critical. They will be able to support us with historical incident information and will actively support the development of better reporting formats and business analytics to understand VRU incidents better. They will also support us with data scientists and actuaries.

- **Peak Bodies**: Organisations representing cyclists, pedestrians, motorbike riders, people with disabilities, seniors and school children.

- **Hospitals**; better and standardised hospital reporting is a crucial input.

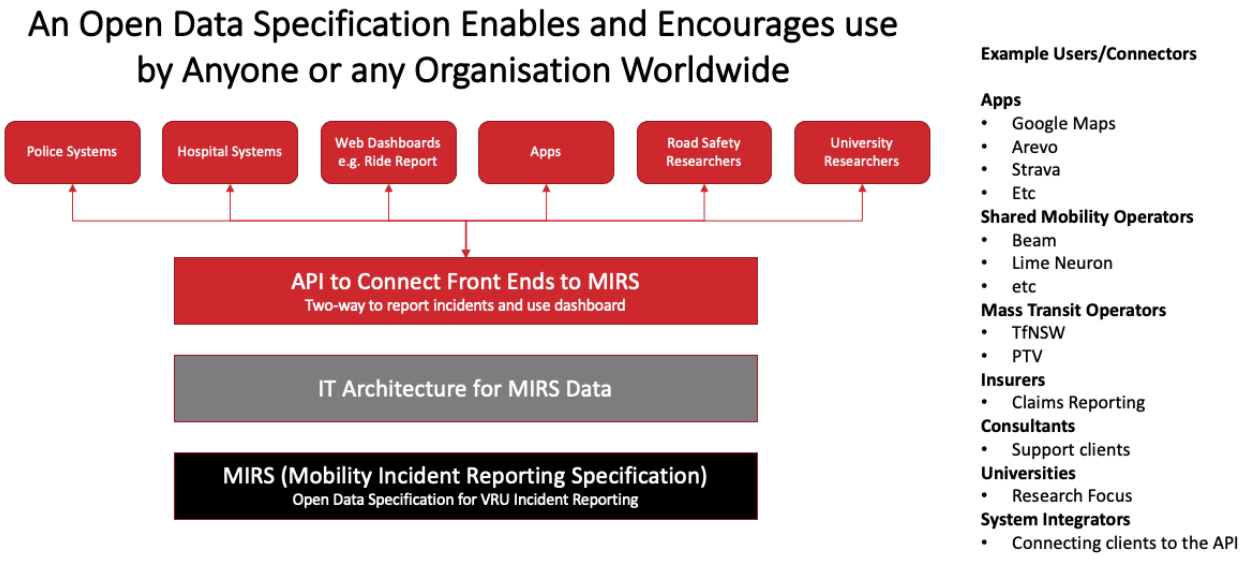
- **Police**, as with hospitals, Police are essential to having actional and consistent information from incidents to identify causation and solutions.

- **Worldwide Industry Leaders**: we will socialise the project and seek input from other organisations looking at similar issues. These include the OECD International Transport Forum and ETSC (European Transport Safety Council).

Some of these will form part of the core team; others will be involved through a regular "Advisory Board" of the project.

Deliverables

Overall Framework

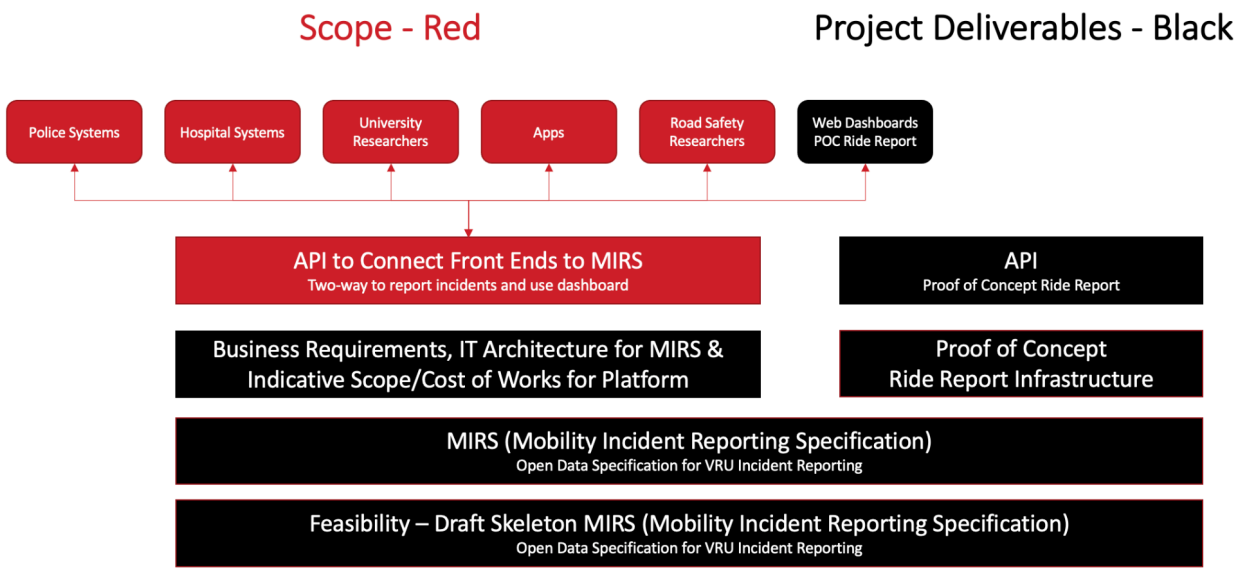


Project Scope and Deliverables Overview

As a research project, the core deliverable will be the Open Data Specification - MIRS - Mobility Incident Reporting Specification. This will be a detailed document defining frameworks for standardised reporting, a data dictionary of the fields and structure and specifications for the technology required to support MIRS.

To mitigate risk, the initial three months will develop the skeleton of MIRS for review, revisions and agreement with the AAA stakeholders and the project Advisory Group. Following agreement on the skeleton of MIRS, the project will develop a detailed final MIRS within six months and work concurrently to develop the proof of concept technology for both the MIRS platform and the API, enabling organisations to integrate with MIRS for incident reporting and analysis.

The final three-month stage will prepare detailed technical documentation of the MIRS platform and API, enabling indicative timing and costs to be prepared for the production system. Ride Report will deliver proof-of-concept technology for the platform and API, leveraging their existing technology, skills, and experience.



Open Data Specification - MIRS

- **MIRS** (Mobility Incident Reporting Specification), An Open Data Specification for Incident Reporting of Vulnerable Road Users
    - A document specifying definitive data structures, fields and processes for reporting incidents involving VRUs

MIRS Platform

- A Proof of Concept Platform for storing incident data collected using MIRS - Ride Report will demonstrate this on their existing platform.

- A Business and Systems Requirement document for a standalone platform to capture and manage data captured through MIRS.

- An indicative costing of developing the initial MIRS platform.

MIRS API

- An API from the MIRS platform to enable multiple “Endpoints” to connect to MIRS
    - Endpoints include web dashboards, apps, road safety researchers, university researchers, governments, insurers, public transit operators, hospitals, police, others

MIRS End Point

- A sample Endpoint able to show how users will access MIRS
    - An incident reporting example
    - A dashboard example looking at reporting
- An indicative costing of a typical End Point connection to the MIRS API.

Data Sources

The data sources we will leverage for this project include the following:

- Ride records from Ride Report. Over 200 million rides have been tracked through Ride Report, including more than 10 million in Australia. Ride Report already has partnerships with government agencies and micromobility operators across Australia. Ride Report has a considerable amount of trip data for cities across Australia. Leveraging these pre-existing relationships, distribution channels, and datasets will save us time and get to value quicker.

- Zipidi models on road safety for micromobility are built from global data reviews of organisations and countries reporting road safety information. Zipidi has built comparative risk rating models covering 100+ countries and has prepared risk ratings for clients in Australia, NZ, UK/Europe, the Middle East, Asia, North America and Latin America.

- Anonymised insurance data.

- Anonymised incident data from rental operators.

- Police reports.

- Hospital reports.

- Ride data from Ride Tracking Apps such as Strava, Apple Fitness, Google and others.
- Other sources identified through the project.Why have an Open Data Specification for Vulnerable Road User Incident Reporting?

An Open Data Specification for incident reporting of vulnerable road users can help standardise how data about incidents involving these individuals is collected, organised, and shared.

This can make it easier for different organisations and individuals to access and use the data, enabling them to understand better the risks and hazards that vulnerable road users face. It can also help to facilitate research and analysis of the data, which can, in turn, be used to inform policies and programs to improve the safety of vulnerable road users on the roads.

Overall, having a standardised Open Data Specification for incident reporting of vulnerable road users can help to support efforts to make roads safer for everyone.

Open Data Specification Example - Mobility Data Specification (MDS)

The Mobility Data Specification (MDS) is a digital tool that helps cities better manage transportation in the public right of way. MDS standardises communication and data-sharing between cities and private mobility providers such as e-scooter and bike-share companies. This allows cities to share and validate policy digitally, enabling vehicle management and better outcomes for residents. Plus, it provides mobility service providers with a framework they can reuse in new markets, allowing for seamless collaboration that saves time and money[2].

MDS is governed by the Open Mobility Foundation (OMF), an open-source foundation that creates a governance structure around open-source mobility tools, beginning with a focus on the Mobility Data Specification (MDS). By creating an open-source foundation, OMF can offer a safe, efficient environment for stakeholders, including municipalities, companies, technical, privacy, policy experts, and the public, to shape urban mobility management tools that help public agencies accomplish their mobility policy goals[3].

Ride Report's Role Shaping MDS

Ride Report is a long-time charter member of the Open Mobility Foundation and a founding stakeholder in the development of the Mobility Data Specification. As active and contributing members across several working groups, Ride Report works to advance these specifications and ensure that cities have the data and control they need, while using built-in protections that protect individual privacy and advance Open Data efforts. Examples of Ride Report's open source contributions and developments supporting MDS include:

- In MDS 1.0, Ride Report authored support for Fees and Subsidies. For the first time, this enabled cities to use MDS to assess parking, deployment, and usage fees.

[2] Source: https://www.openmobilityfoundation.org/about-mds/

[3] Source: https://www.openmobilityfoundation.org/about/

- In MDS 1.1, Ride Report authored the Geography Driven Events, a new capability allowing cities to receive real-time data about street and curb usage while protecting potentially sensitive information about the trip.
- In MDS 1.2, Ride Report's work with cities and operators led to the development of the new public-facing data Requirements API that provides increased transparency and accountability around city policies and data collection practices. Last year, Ride Report became the first company to implement this API.
- Ride Report delivered the industry's first Global Micromobility Index powered by MDS data, which is publicly accessible yet maintains the highest standards for data privacy.
- Ride Report's long and intimate involvement in OMF and MDS will inform the team's thinking on developing and governing a new open-source specification like MIRS.

Framework

To deliver a practical open data specification, a framework must consistently record incidents and each incident's key characteristics. This section looks at the critical areas of the framework and gives examples of the types of information to be captured in each category. This framework will be developed and socialised in the feasibility phase to ensure a robust framework is created to meet the needs of all stakeholders.

Categories of information to be captured include:

- Information on Person Reporting Incident
- Incident Date, Time, Location
- VRU Type
- Device Owner
- Other Vehicle(s) in Incident
- Injury Severity
- Injury Location & Type
- Personal Protection Equipment Worn
- Has an Insurance Claim been Lodged?

Examples of fields in each category are in the tables below.

Information on Person Reporting Incident

Role	Injured Party, Injured Third Person, Driver of registered Vehicle, Police, Hospital, Rental Operator, etc.
Optional Demographic Data	Age, Gender, Postcode
Contact Information	Email, Phone

Incident Date, Time, Location

Date of Incident	
Time of Incident	
Location	Type address or select on map
Ride Link (if available, e.g. MDS, Strava)	

VRU Type

Pedestrian	
Cyclist	
Skateboard Rider	
Kick Scooter Rider	
e-Scooter Rider	
Mobility Scooter Rider	
e-Skateboard Rider	
e-Bike Rider	
e-PMD Other Rider	
Other non-powered device	
Bystander	
Jogger/Runner	
Motorbike Rider	
e-Moped Rider	

Device Owner

Privately Owned	
Rental Operator	Dropdown list or similar
City Owned	Specify
Company Owned	Specify

Other Vehicle(s) in Incident

Other VRU	Select from VRU Type List
Car	
Truck	
Bus	
Train	
Tram/Light Rail	
Other - Specify	

Injury Severity

Minor, No medical treatment sought	
ModerateMedical treatment sought but o hospitalisation or ambulance	
Serious, means ambulance attended and transported patient or patient was admitted to hospital through private transport	
Critical, fatal/life threatening	

Injury Location & Type

Primary Site of Injury (Dropdown)	Primary Diagnosis (Dropdown)
Foot	Soft Tissue Injury
Upper or Lower Leg	Laceration/Puncture/Sting
Knee	Fracture/Dislocation
Back/Spine	Dental injury
Front Torso/Chest	Concussion/Brain injury
Upper and Lower Arm	Other/Unknown
Hand/Wrist	
Face including Teeth	
Head (except Face)	
Other/Unknown	

Personal Protection Equipment Worn - Select All that Apply

Helmet	
Gloves	
Knee Guards	
Elbow/Wrist Guards	
Protective Clothing	
None	

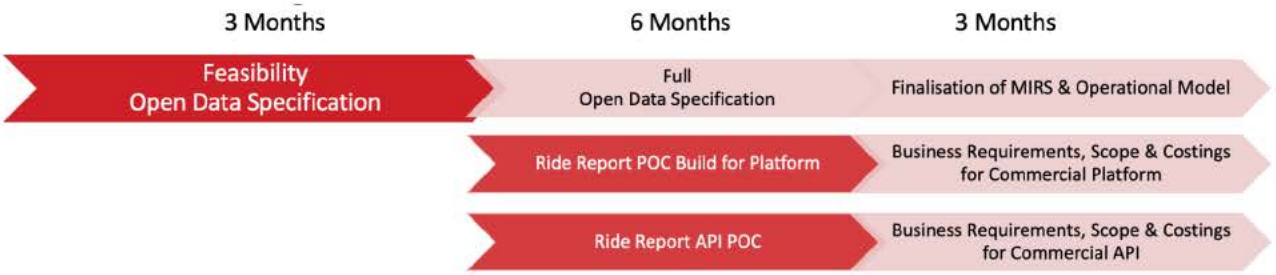
Has an Insurance Claim been Lodged?

Yes	Link to Claim
No, I would like to lodge a claim	Link
No, I will not be claiming	

Timing and Cost

We have estimated costs based on AAA's advice to ensure our proposal was adequate in terms of costs, as there is no opportunity to request additional funding. We have assumed around 100% utilisation of the allocated resources. As the project progresses, we may find less than 100% is required of some resources and for shorter periods. As such, we see the budget as the maximum required.

While this is a "research project", it is developing a valuable Open Data Specification and capabilities. There will be multiple opportunities for the AAA to commercialise this project alone or in partnership with other organisations, as identified below.



Resource	Basis (220 days/year)	Feasibility 3 months	Develop 3-6 months	Document, Define, Cost	Total
Zipidi	$1,200/day, 1 FTE, 100%	$66,000	$132,000	$66,000	$264,000
Ride Report	$1,200/day, 1.25 FTE, 100%	$82,500	$165,000	$82,500	$330,000
Program Management	$1,200/day, 1 FTE, 100%	$66,000	$132,000	$66,000	$264,000
Business Analyst/ Technical Writer	$1,000/day, 1 FTE, 100%	$55,000	$110,000	$55,000	$220,000
Policy & Governance Advisor	$1,000/day, 1 FTE, 25%	$16,500	$33,000	$16,500	$66,000
Total		$286,000	$572,000	$286,000	$1,144,000

Commercialisation Opportunities

Open Data Specifications create commercial opportunities for many parties. The specification itself is open and, therefore, free for anyone. However, technology to manage data collected in an Open Data Specification can be expensive, and many companies do not wish to build systems themselves.

For example, with the MDS Specification, a small number of companies have written software to leverage the Specification and enable others to use and access it as a service. Ride Report is a good example of such a company. Ride Report has 100+ cities that require data and policy management systems. Ride Report provides this as a service to cities rather than each city developing its own solution.

It also ensures mobility operators have a common platform to report through, making their lives easier.

Some of the Commercial opportunities from MIRS will include:

- Building a MIRS platform and API - this could be regional or broader - it could also be tailored to different use cases, e.,g hospitals may have different needs from rental operators to insurers.
    - Such a platform could be a commercial venture of the AAA itself or with other major motoring associations or technology providers
    - Such a platform would charge various fees for services provided

- Some organisations may take an API approach and develop an industry-specific API that connects to common existing platforms. For example, an API may enable many hospitals quick access to the MIRS solution if hospitals use a common platform.

- Researchers/Consultants may choose to specialise in analysing data from IRS and providing services based on their learnings and insights.

- Partnering with other organisations that are working in the field of incident reporting. This could include organizations that are developing software tools for incident reporting, as well as organizations that are involved in collecting and sharing incident data.

Many more opportunities exist from open data specifications. This section highlights the commercial opportunities that AAA or its members may pursue.

Our Team

Zipidi

Zipidi works with micromobility manufacturers, retailers, share operators, major organisations, insurers and regulators worldwide.

Krystyna Weston is a customer-centric strategic thinker, collaborator and problem solver. Krystyna has a track record of bringing innovative ideas to life, building products and business partnerships and leading teams. An experienced Non-Executive Director, CEO, and Start-Up Founder, Krystyna has worked across various sectors, including financial services (wealth management, funds management, and general insurance), digital innovation, health insurance, and micromobility/transport.

Krystyna leads Zipidi's global micromobility insurance practice solving client problems and designing leading-edge insurance solutions.

Stephen Coulter is a customer focussed, data-driven leader and innovator with many years of experience as a senior executive in financial services, mobility, telecommunications and travel. He has lived and worked in Australia, Asia, Mexico and the USA.

Stephen is now co-founder of Zipidi, which specialises in risk management, strategy, insurance, regulatory advice and technology for micromobility. Zipidi works with manufacturers, retailers, share operators, major organisations and regulators worldwide.

Ride Report

Michael Schwartz leads Ride Report's shared micromobility practice, overseeing product and business strategy to provide public agencies with the tools and expertise they need to achieve transportation priorities. He brings more than 15 years of experience implementing data-driven transportation programs, plans, policies and infrastructure. Michael is motivated by the need to transform how people get around to save the planet and increase access while saving lives by eliminating traffic-related fatalities. He believes shared public-private partnerships can achieve these ends more expeditiously and effectively than either set of entities working independently.

Kory Young leads Ride Report's business development efforts, overseeing market expansion and partnership strategies with public agencies and commercial organisations globally. He is skilled at aligning strategic public and private stakeholders and brings nearly 5 years of experience implementing successful sales and partnership initiatives. Kory is motivated by the positive impact active transportation needs to have for a greener future on earth and believes technology and data have the power to drive behaviour change while increasing sustainable and equitable transportation outcomes.

Michal Nakashimada is a leading voice in the shared mobility space. In addition to leading Ride Report's product development, he writes the Movements newsletter, a roundup of stories about the mobility industry, focusing on mobility software, cities, and infrastructure.Before Ride Report, Michal was a consultant with multiple micromobility and mobility technology companies. He was a product manager at moovel Group (Acquired by Daimler AG), where he helped build a multimodal (MaaS) transportation platform for public transit agencies and cities.

Mike Guida is a software engineer with experience in mapping systems and data visualisation. He leads Ride Report's engineering team, which is focused on helping transportation departments understand and apply data from various sources to evaluate and improve transportation outcomes. He has experience working with open data standards, such as MDS, to ensure privacy and compatibility are key outcomes. Mike is excited by opportunities to use technology to make cities safer and more enjoyable for bikes.

Project Management

Sarah Durrell is a highly experienced senior Program and PMO Manager, who offers extensive experience in people, change and project management. She has successfully delivered large-scale, multi-project, complex programs (budgets from $20M to $175M) with an ability to balance the demands of governance, transparency pragmatically, and project management rigour with project delivery.

Her experience includes an extensive practical understanding of methodologies including PMBOK, Prince2, Agile, Waterfall and LEAN/Six Sigma, supported by a master's degree in project management and Agile practitioner certification. Sarah's roles have covered a broad range of industries, including building a best practice project management framework to support project delivery at a Government Statutory Authority (WorkSafe Victoria), leading a large compliance remediation program as well as the PMO for the float of Australia's largest health insurer (Medibank), overseeing a scoping study for the potential ownership options of the Commonwealth owned rail tracks from Perth to Brisbane (ARTC), managing the integration office for a $2.03B merger and acquisition for one of Australia's largest energy companies (EnergyAustralia) and several technologies and compliance programs for one of Australia's leading banks (ANZ).

She is an engaging communicator who builds rapport as a trusted advisor at all levels through interpersonal relationships and communication by embedding a 'no surprises' partnership with key stakeholders through effective collaboration and teamwork.

Sarah has a unique ability to make sense out of chaos and an inclusive approach that builds trust with stakeholders and teams alike, and she thrives where she can use her expertise to mentor, uplift people's skills and successfully deliver the change through project delivery.

Policy and Government Advisor

Peter Hertan is an experienced executive with detailed knowledge and understanding of the public policy process, able to assist organisations to achieve their objectives dealing with the ever-increasing complexity of Government's legislative and policy environment. He has extensive public sector and

commercial experience, successfully managing key Government programs, as Board Chairman and member, as CEO of statutory authorities and Director of large Government divisions. He has a history of achieving positive outcomes in highly complex and politically sensitive projects, managing large capital and operational budgets.

Peter's industry roles and expertise include working at the local, state and national levels for private businesses, entrepreneurs and community organisations, providing advice on strategic planning, risk management, project management, capital works and Government relations.

Advisory Group

Potential representatives include

AAA Representative (s)

Motoring Association Representatives

University Representative(s) TBA

Insurance, Jahangez Chaudery, MSc, Insurance & Risk Management, Occupational Accident Underwriter ibott, Apollo Syndicate, Lloyds of London

Cycling, Peter Bourke or Stephen Hodge, WeRide Australia

Cycling, Stuart Outhred, Amy Gillett Foundation

Shared Scooter Bike Operators

- Will Peters, Policy Advisor and Government Relations, Australia and NZ, Lime
- Stephen Farmer, General Counsel, Neuron
- Tom Cooper, General Manager Australia and New Zealand, Beam

Motorcycle Australia Representative

Walking Representative

TAC Representative

NDIS Representative

Department of Transport Representatives

- TfNSW, TBC
- Victoria, TBC
- Queensland, TBC

Contact Details

Zipidi

Background information and Notes Not Used

Deliverables

The project will deliver staged outputs as data is aggregated and integrated. We will plan to have three monthly releases and schedule a review at 12 months to determine whether the project should continue or has delivered a solution that meets industry and stakeholder needs.

Deliverables will include:

1. An Open Data Specification for VRU incident reporting. **MIRS** (Mobility Incident Reporting Specification) will become this incident reporting standard for Australia and potentially the global standard, as nothing currently exists.

2. An online “dashboard” for analysis and insights into causes of incidents to VRUs.

3. An online incident reporting questionnaire able to be integrated into Apps, completed online or used in customer service call centres by hospitals, police and others to ensure consistent data capture.

4. Initial analyses of data integrated to provide benchmarking of incident reporting capabilities.

5. Benchmarking of root causes of VRU incidents from the project as business analytic reports are developed.

6. Incident overlays on Ride Report’s existing geo-location mapping platform to identify hot spots and prioritise infrastructure and policy to reduce incidents with VRUs.

Key People

Stephen Coulter, Co-Founder Zipidi

Krystyna Weston, Co-Founder Zipidi

Michael Schwartz, SVP Shared Mobility, Ride Report

Michal Naka, Senior Product Manager, Ride Report

Kory Young, Growth Manager Ride Report

Background on Zipidi and Ride Report

Zipidi specialises in risk management, strategy, insurance, regulatory advice and technology for micromobility. Zipidi works with manufacturers, retailers, shared scooter/bike operators, data specialists, businesses and regulators worldwide. Zipidi arranges various insurance for rental operators and last mile delivery businesses. Zipidi has built risk rating methodologies for micromobility and uses actual incident and claims information to iterate Zipidi models.

Ride Report is the leading global platform for aggregation of real time data from shared scooter, bike, moped and other devices. Ride Report has supported more than X cities worldwide since 2014 and has tracked more than 200 million rides.

All major rental ebikes and escooter companies worldwide already integrate to Ride Report - Lime, Neuron, Beam, Bird, Helbiz, Superpedestrian and many more.

Ride Report is the default industry platform in Australia and New Zealand and is being used in Australia in Melbourne, Geelong, Ballarat, Brisbane, Adelaide and throughout NZ. It is likely to be the platform for NSW, Perth and Tasmania.

Ride Report and Zipidi work with global data standards for micromobility:

- MDS, brief description
- GBFS, brief description

These are the industry standards for reporting micromobility rides for city program management, operations and policy management.

The Need for Data for Vulnerable User Incident Reporting

Zipidi and Ride Report have commenced working on a project to integrate various data sources to provide an incident reporting platform for governments, shared mobility operators, cities and insurers.

We had identified from our insurance projects, and transport departments data requests that there is no common method for incident reporting nor a data standard to ensure consistency for all stakeholders involved in reporting and managing such incidents:

- Share Operators
- Hospitals
- Police
- Riders
- Pedestrians
- Other affected parties

There is also a need for reliable data to inform cities and governments of the real risks and causes of crashes and incidents involving vulnerable road users across all modes of transport. This will help governments understand the relative risks between modes and enable better regulation to mitigate the risks and causes identified.

As NSW and Victoria are currently determining regulations for eScooter usage, there is an immediate need for such data. In addition, Zipidi has been in dialogue with the transport departments of the UK

and Ireland, who are in the same position as Victoria and NSW - all are seeking to legalise eScooters and determine optimal regulatory environments by mid-2023.

Early Work by Zipidi and Ride Report

We have looked at existing data sources, models and requirements. For example

- NZ's Accident Compensation Commission the government insurance covering any accident of any type in NZ. As accidents on any mode of mobility are covered, time series data is available for incident levels, injury severity, injury type, costs for injuries and much more. The ACC framework is a good starting point.

- Incident Reporting framework of TfNSW. TfNSW already has some incident reporting for transport. It also draws police and hospital data and seeks to match these to provide insights into causes of crashes. The matching process is not efficient due to incomplete, inconsistent and slow reporting by police, hospitals and other parties.

- Incident reporting within shared mobility applications. This is different from one operator to another and does not provide consistency or the detail necessary.

- Insurance claims. These are also often incomplete and lack detail as the claims processing businesses do not have consistent methodologies and the user reporting forms are poor.

What's Required

- Aggregation and Integration of Existing Data
- Standard method of collecting incident data
- Data Standard for Reporting Incident Data - Global Potential
- Platform for delivering incident data to stakeholders
- Participation by all rental operators
- Last mile delivery?

Other Data Sources

- Ride Tracking
    - Strava
    - Apple
    - Google
    - Others

The AAA Research Framework

What Causes VRU Crashes/Incidents

Why

Only understanding causations will lead to effective solutions and prioritisation.

How

- Sourcing and Aggregating Incident Data
    - Hospital Admissions
    - Police Data
    - Crowd Sourced Data
    - Shared Bike/eScooter Feeds - MDS, GBFS
    - Detailed case reports/interviews
    - Anonymised insurance claims

Output

- Open Data Standard for Incident Reporting/Data Format/Standard
- Prioritise evidence based solutions

Outcomes

- Knowledge, Insights, Wisdom

Stakeholders

- Federal Governments
- State Governments
- Cities
- Health Departments
- Insurers
- Police
- Hospitals
- Share Operator Companies
- Vehicle Manufacturers
- Peak Bodies - Cyclists, Motor Bike, Pedestrians, etc
- Community

Challenges

- Privacy
- Access to Hospitals/Patients
- Data Integrity/Consistency
- Project Design
- Appetite for Self Reporting

Kory/Michal initial thoughts/brainstorm

High-level idea: Develop an Australian wide toolkit to report micromobility incidents.

Evaluation Criteria Thoughts:

Impact

- Get insights into a segment of vulnerable road users: micromobility riders.

- Create a standardised way to share information about micromobility incidents (both shared and private)
- Combine incident datasets with other related datasets to figure out where exposure and crashes occur
- Use incident data insights to develop KPIs to reduce micromobility incidents.
- Use micromobility incidents to inform cities on highest priority infrastructure investments to improve safety outcomes for vulnerable road users.
- Technology to identify dangerous road segments and target infrastructure improvements
- Enable cities across AU and nationally to benchmark micromobility incidents and road safety exposure for vulnerable road users against one another to develop improved policy and regulation approaches

Project Quality

- **Rationale:** Micromobility incidents have been a hot topic of discussion in the press and public over the last few years. However discussion around incidents are often poorly understood because data has been limited, fragmented across silos, and often times never reported. In order to have a more accurate picture of micromobility incidents and move forward our discussions into actionable policies and infrastructure improvements, we need a systematic way to report incidents across private and shared micromobility. Now is the time to gather stakeholders across micromobility operators, government and universities to develop a nationwide toolkit for micromobility incident reporting.

- **Project Team track record:**
    - Zipidi bio
    - Ride Report has experience working with over 100 public agencies across 4 continents, ingesting hundreds of millions of shared micromobility trips, building digital solutions for realtime and historical data analytics and insights

- **Monitoring and Evaluation Process:** Structured deliverable and target timeline including:
    - Initial discovery and data collection
    - Develop standardization methodology and resources
    - Build tools to evaluate road safety data and inform infrastructure investment

Collaboration

- Universities
- Shared Micromobility Operators
- Insurance Underwriter
- State Transport Departments
- Cycling, Pedestrian, Motorbike industry representatives

Value for Money

- Ride Report already has partnerships with Governments and Micromobility Operators across Australia. Ride Report already has a considerable amount of trip data for cities across Australia. Leveraging these pre-existing relationships, distribution channels, and datasets will

save us time and get to value quicker.

- In-kind: Ride Report & Operator datasets. Operator outreach to riders.

Zipidi Submission to the Queensland Legislative Assembly Inquiry into E-Mobility Safety and Use

June 2025

Executive Summary

Queensland is at a turning point in how it approaches urban transport. As population growth accelerates, particularly in South East Queensland, existing road infrastructure and car-centric models are proving unsustainable. Congestion, emissions, and transport inequality are rising, while cities face limited ability to expand roads or parking. In this context, **e-mobility**, including e-bikes, e-scooters, and lightweight electric vehicles, offers an immediate, scalable, and low-cost solution.

Micromobility sits between walking and public transport in the mobility hierarchy. It is ideal for short trips, first/last mile connections, and urban environments. It reduces car dependency, supports health and climate goals, and expands mobility access to younger, older, and lower-income Queenslanders.

However, innovation has outpaced regulation. Proven vehicles such as throttle-only e-bikes (limited to 25 km/h), speed pedelecs (up to 50 km/h), and emerging heavier vehicles remain illegal for public use in Queensland, despite being legal, regulated, and widely used in Europe, the UK, Singapore, and North America. This mismatch is leading to unsafe behaviour, the import of non-compliant vehicles, and a growing public safety and enforcement challenge.

Zipidi recommends a modernised, risk-based regulatory framework that classifies e-mobility devices by speed and weight rather than outdated metrics such as power wattage or rigid form factors. This approach reflects global best practice and supports safe innovation.

Queensland's dual responsibilities, as a leading tourism destination and host of the 2032 Olympic Games, make this reform especially urgent. Cities like Brisbane, Cairns and Noosa are already popular for micromobility tourism. The Olympics present an opportunity to showcase Queensland as a world leader in sustainable, people-friendly mobility.

A core component to underpin this transformation is the adoption of 21st-century regulatory technology incorporating digital fingerprints and product passports to verify vehicle certifications to safety and quality standards.This technology is already used in other industries and has been mandated by the EU for lithium-ion batteries by 2027 and e-mobility vehicles by 2030.

It enables real-time verification of vehicle certifications, legality, battery safety, and jurisdictional compliance, helping consumers, police, councils, and regulators make informed, confident decisions.

This report outlines a coherent path forward. It recommends:

- **A simplified two-tier classification** based on speed (≤25 km/h and ≤50 km/h) and weight (above/below 60 kg).
- **Legalisation of proven, certified vehicles**.
- **Mandatory verified certification** to international safety and quality standards
- The adoption of digital verification technology to future-proof compliance and safety.
- **Improved enforcement tools**, public education, and nationally consistent laws.
- Coordinated action to close **federal-state importation and compliance loopholes**.

If Queensland gets the policy settings right now, it can lead Australia in creating a safer, smarter and more inclusive transport system.

Why e-Mobility Matters: Context for Regulatory Reform

A Critical Moment for Urban Mobility in Queensland

Queensland is at a pivotal point in shaping its transport future. Rapid urbanisation, rising congestion, housing intensification, and climate pressures are converging to expose the limits of traditional, car-dominated transport models, particularly in South East Queensland, where population growth is surging.

According to Infrastructure Australia, the majority of new residents over the next two decades will live in **already congested urban areas**. Yet the ability to add more roads or parking is severely constrained by geography, cost, and environmental impact. Cities cannot build their way out of congestion. Instead, they must **shift mode share**, moving people more efficiently, more safely, and with fewer emissions.

This means investing in a transport system that is:

- **Space-efficient**
- **Low-emission**
- **Affordable and equitable**
- **Scalable without major infrastructure expansion.**

The Role of e-Mobility in the Transport Hierarchy

e-mobility, including e-bikes, e-scooters, cargo bikes, and other lightweight electric vehicles, sit between walking, cycling, and public transport. These modes of transport are:

- **Faster and more convenient than walking for trips of 1–5 km**.
- **More flexible than fixed-route public transport**, especially in low-density suburbs.
- **More space and energy-efficient than cars**, especially for single-occupant or short journeys.

It supports first/last-mile access to trains, ferries and buses. It replaces short car trips that generate **disproportionate congestion and emissions**. It gives people **transport choices** who might otherwise be excluded, including young people, low-income earners, and those unable to drive.

In a future transport hierarchy, **micromobility will play a critical role**, alongside:

- Public transport for medium-to-long trips
- Active transport for local access
- Shared vehicles and flexible on-demand services for niche use cases

When designed and regulated well, e-mobility:

- **Eases pressure** on roads and public transport networks
- **Reduces car dependency**, especially for commuters and short journeys
- **Supports health and climate objectives**
- **Connects people to opportunities**, shops, education, and jobs.

Why Regulation Must Catch Up Now

The rapid uptake of e-mobility, often in the absence of clear rules, has created both opportunities and growing pains. The market has outpaced regulation. The result is:

- A proliferation of **non-compliant or dangerous devices**
- Safety risks and **public confusion and ignorance about what is legal**
- **Inequities** in who can safely and legally participate in micromobility
- Missed opportunities to shift short car trips to cleaner alternatives.

The current patchwork of definitions, certification gaps, and weak enforcement has reached its limit. Queensland now needs a **coherent, forward-looking regulatory framework** that enables safe, sustainable e-mobility to scale, supporting broader state goals around:

- Urban liveability
- Transport system efficiency
- Emissions reduction
- Community health and wellbeing.

A Tourism and Events State on the World Stage

Queensland is also Australia's leading tourism state and the proud host of the upcoming **2032 Olympic and Paralympic Games**. From Brisbane to the Gold and Sunshine Coasts, the state's most iconic destinations are dense, walkable urban and waterfront environments, precisely the kinds of places where micromobility flourishes.

Visitors increasingly expect **clean, modern, and low-friction transport options**, especially for short trips between hotels, venues, restaurants, and attractions. Shared e-scooters and e-bikes have already become part of the tourism experience in cities like Brisbane, Cairns, and Noosa.

The 2032 Olympics will bring an international spotlight and significant transport demands to Queensland's cities. This presents a **once-in-a-generation opportunity** to:

- Showcase sustainable, tech-enabled mobility
- Demonstrate how e-mobility can be safely integrated into urban precincts
- Develop a regulatory framework that strikes a balance between **visitor access, safety, and local amenity**.

To fully realise this opportunity, regulation must support **well-managed, compliant micromobility systems** that reflect global expectations and community needs.

e-Mobility as a Public Policy Lever

Micromobility is not a toy or a novelty, it's a serious mode of transportation. It is **a crucial component of the 21st-century transportation puzzle**. With the right policy settings, it can deliver enormous public value and reduce the strain on overburdened road and rail systems.

This inquiry is a timely and necessary step toward ensuring that Queensland leads, not lags, in building a transport system that is:

- **Fit for future growth**
- **Safe for all users**
- **Open to innovation**
- **Anchored in community trust.**

Innovation Is Leading Regulation

Queensland, like many jurisdictions globally, faces a fundamental challenge in regulating e-mobility - **innovation is outpacing legislation**. As new and more capable devices enter the market, offering practical solutions for commuters, commercial users, older adults, and people with disabilities, many remain **illegal under outdated definitions**, regardless of their quality or safety.

Evolving Devices, Diverse Needs

Globally, functional micromobility vehicles that are **safe, certified, and widely used** include:

- **Throttle-only e-bikes** limited to 25 km/h — ideal for older adults, people with disabilities, delivery riders, or those with reduced leg strength.
- **Speed pedelecs** with pedal assistance up to 45–50 km/h — used in Europe and Singapore with light vehicle registration and e-moped helmet requirements.
- **High-powered e-bikes** exceeding 250W, limited to 25 kph, used for cargo delivery, disability transport, or hilly terrain.
- **Electric trikes and seated PMDs limited to 25 kph** — stable, accessible formats increasingly adopted by people with limited balance or endurance.
- **Cargo bikes, e-scooters and PMDs limited to 25 kph** - vehicles designed for last-mile delivery and local shopping, delivery and trade use.

Many of these devices are **legal and regulated** in the European Union, the United Kingdom, Singapore, and parts of North America, supported by robust safety and quality certification schemes (e.g. EN 15194, EN17128, UL 2271, UL 272, UL 2849[1]), structured usage categories, and clear licensing pathways.

However, in Queensland and much of Australia, these same devices are broadly illegal for public use, irrespective of their suitability, safety, or certification.

A Two-Tier Reality in Australia

This regulatory lag has created a **dual system**:

- **Responsible importers and retailers** cannot import high-quality, standards-compliant vehicles that are safe and serve real needs.
- **Unregulated and unsafe devices** — often marketed online with no certification, speed limits, or safety information — fill the gap.

Without legal pathways for innovative, functional designs, users are turning to **illegally imported, uncertified, or DIY-modified devices** that pose significant safety, fire, and enforcement risks.

[1] See Appendix A for details on standards and certifications for safer e-mobility and lithium-ion batteries

The Path Forward: Legalise and Certify

Zipidi supports a regulatory shift that **legalises proven e-mobility formats**, while ensuring they meet verifiable **safety and quality standards**. This approach:

- **Empowers diverse users**, including older riders, people with disabilities, and delivery workers, with transport options that suit their needs.
- **Aligns Queensland with international standards**, enabling access to safe, tested vehicles already common in other advanced economies.
- **Reduces unsafe behaviour** and market distortion caused by blanket bans.
- Prevents Queensland from becoming a dumping ground for illegal and unsafe products - as is currently occurring.

We recommend categorisation that recognises key functional differences:

Category	Characteristics	Proposed Treatment
Class 1: Low-speed devices	Max 25 km/h, any form factor (throttle/pedal), e.g. PMDs, throttle e-bikes, seated e-scooters	No license or registration; must be provably certified to recognised safety and quality standards
Class 2: Mid-speed vehicles	Max 50 km/h, pedal assist or throttle, e.g. speed pedelecs, cargo bikes, some delivery e-bikes	Light registration and license, plus safety and quality certifications and insurance

Within each class, multiple categories would exist as they do in Europe and the USA. The categories will also be divided by weight for devices above and below 60 kg.

By regulating based on **function and safety**, rather than arbitrary wattage or form factor, Queensland can create a **future-ready framework** that supports innovation while protecting public safety.

Towards a Coherent Regulatory Framework for e-Mobility

To unlock the full benefits of e-mobility while managing its risks, Queensland needs to work within, and help shape, a **coordinated national regulatory framework**. This framework must clearly define roles for the Commonwealth and States, and ensure safety, quality, innovation, and equity are supported through enforceable and consistent rules.

At present, Australia's regulatory landscape is fragmented. The Commonwealth controls import approvals and certain product safety standards, while the States define how and where vehicles can be used. Even within States, there is no single body responsible for the issues in e-mobility. Frequently transport, electrical safety, environment and consumer affairs have overlapping or discrete responsibility for some elements. These divides have allowed unsafe and non-compliant devices to enter the country, creating downstream enforcement and safety challenges at the local level.

1. Commonwealth Role - Import Standards and Product Safety

Reinstate and Strengthen Mandatory Standards for Imports

The Commonwealth has responsibility for **import approval and product safety standards**, particularly through:

- The **Department of Infrastructure, Transport, Regional Development and Communications** via the ROVER system.
- **Australian Consumer Law** administered by the ACCC and State Fair Trading bodies.
- **Advisory Notices**, which have previously set expectations for the importation of PMDs and e-bikes.

Zipidi recommends that the Federal Government:

- **Reinstate mandatory Advisory Notices** for micromobility devices and related batteries and make them enforceable as binding import controls.
- Require importers to provide **verifiable digital evidence of compliance** with recognised international standards (e.g. EN 15194, EN17128, UL2271, UL 2272, UL 2849, etc.).
- Mandate digital uploads of all compliance documents (certificates, lab reports) into ROVER or a linked system for **automated verification and audit**.
- Require all e-mobility products and batteries to carry **a digital fingerprint and product passport** enabling users, enforcement and stakeholders to verify a product's compliance with a simple mobile phone scan. (The EU already has this requirement, which is mandated from 2027, and all major quality manufacturers have or will have the ability to comply.)

The goal is to ensure that **only safe, verifiably compliant products enter Australia**, thereby reducing the burden on State regulators and preventing unsafe products from reaching consumers.

2. State Role: Regulation of Use, Vehicle Specifications, and Enforcement

Once a vehicle enters the market, States like Queensland are responsible for **how and where** it can be used. There are three essential areas of State-based regulation:

2.1 Safety and Certification Standards (If Not Covered Federally)

Where the Commonwealth has not yet mandated enforceable standards for e-bikes or e-scooters, States must step in to:

- Require **minimum safety certifications** before a device is sold or used on public infrastructure.
- Ensure **compliance with battery and charging system regulations**.
- **Fair Trading NSW** recently introduced mandatory certification to the relevant standards for all e-mobility, e-bikes, lithium-ion batteries and their chargers sold or used in NSW. A summary of this regulation is included in Appendix B. We support the standards legislated by NSW as being appropriate for Queensland to support in the absence of Federal legislation.

These measures are critical to closing the gap between importation and safe public use.

2.2 Vehicle Specifications and Design Rules

States should define clear, **harmonised specifications** for micromobility vehicles used in public areas.

While the Federal Government has a definition based on National Transport Commission research published in 2021, this report was out of date before it was printed. The recommendations made by Zipidi in this report are contemporary and reflect global best practice.

State specifications should focus on:

- **Vehicle dimensions**: weight is the key dimension as speed and weight determine kinetic energy and what is acceptable in regards to injury risk. Queensland currently has length, height and width restrictions which are compromising safety and innovation. Zipidi recommends these restrictions should be removed and only a weight limit apply. Where width issues exist, these should be handled by local place restrictions on maximum width for this path, etc. as for roads.

  Length and width restrictions limit safety and innovation. For example, e-scooter wheels are getting larger as this provides greater stability and safer performance over bumps, cracks and potholes. e-Scooters can have wheels of at least 50cm diameter - compared to the early e-scooters of only 20 cm. Two wheels of 50 cm extend the length by 30 cm. Decks are also getting longer which again provides greater stability.

  The Queensland weight limit is currently 60 kg for e-mobility devices. No limit applies to bikes. 60 kg is the unladen weight of a vehicle. **Europe is moving towards harmonised vehicle specifications and is shifting to a "laden mass" weight limit** - including the weight of the rider and cargo. The European laden mass recommendation is 250 kg.

  Ultimately Zipidi believes a laden mass measure is a better outcome, as the total weight is the impact on kinetic energy - not just the weight of the device.

- **Speed thresholds**: clearly defined categories for ≤25 km/h and 25–50 km/h vehicles. Federal legislation and standards should ensure speed limiters are tamperproof and the devices cannot be unlocked to do higher speeds than permitted.

- **Power thresholds are not recommended**. While the existing pedelec e-bike fits a global standard of 250w power, power is not relevant beyond this type. Power is required for multiple reasons in other categories including supporting heavier riders, cargo and use in hillier areas Power does not increase safety risks - speed is the issue to manage.

- **Design and safety features** such as maximum acceleration, braking speed, lighting, reflectors, audible alerts, etc. These are covered by the recommended standards Zipidi proposes the Commonwealth implements and Queensland supports.

Design matters. Design improvements such as **larger wheels**, **wider decks**, **seats**, and **sturdy frames** reduce crash rates and injury severity, and are far more scalable than technology-based interventions limited to shared and high-end devices.

While the TMR briefing paper has some emphasis on technology, design features and construction quality have a much higher impact on safety than technology. Technology is most advanced in shared e-mobility but limited in private vehicles. Even in shared vehicles, it cannot overcome poor rider behaviour, which is the cause of many crashes.

States should aim to **harmonise these specifications across jurisdictions** through coordinated policy development with industry experts represented in the group.

2.3 Riding Rules and User Conduct

States remain responsible for rules regarding **where, how, and by whom** micromobility devices can be ridden. This includes:

- **Helmet laws and age restrictions**

- **Speed limits** in different zones (e.g. footpaths vs. shared paths vs. roads)

- **Permitted zones of operation** (including local council designations)

- **Rules on tandem riding, alcohol and drug affected riding, and rider conduct**.

These riding rules must be clear, consistent, and widely communicated, and integrated into shared operator platforms and point-of-sale disclosures for private users.

Clear, consistent rules provide police with a clear mandate to enforce behaviour rather than illegal and unsafe vehicles, which police do not currently have the equipment to detect.

2.4 Proposed Regulatory Framework

Zipidi recommends a broad framework for defining e-mobility devices. The key determinants are speed and weight.

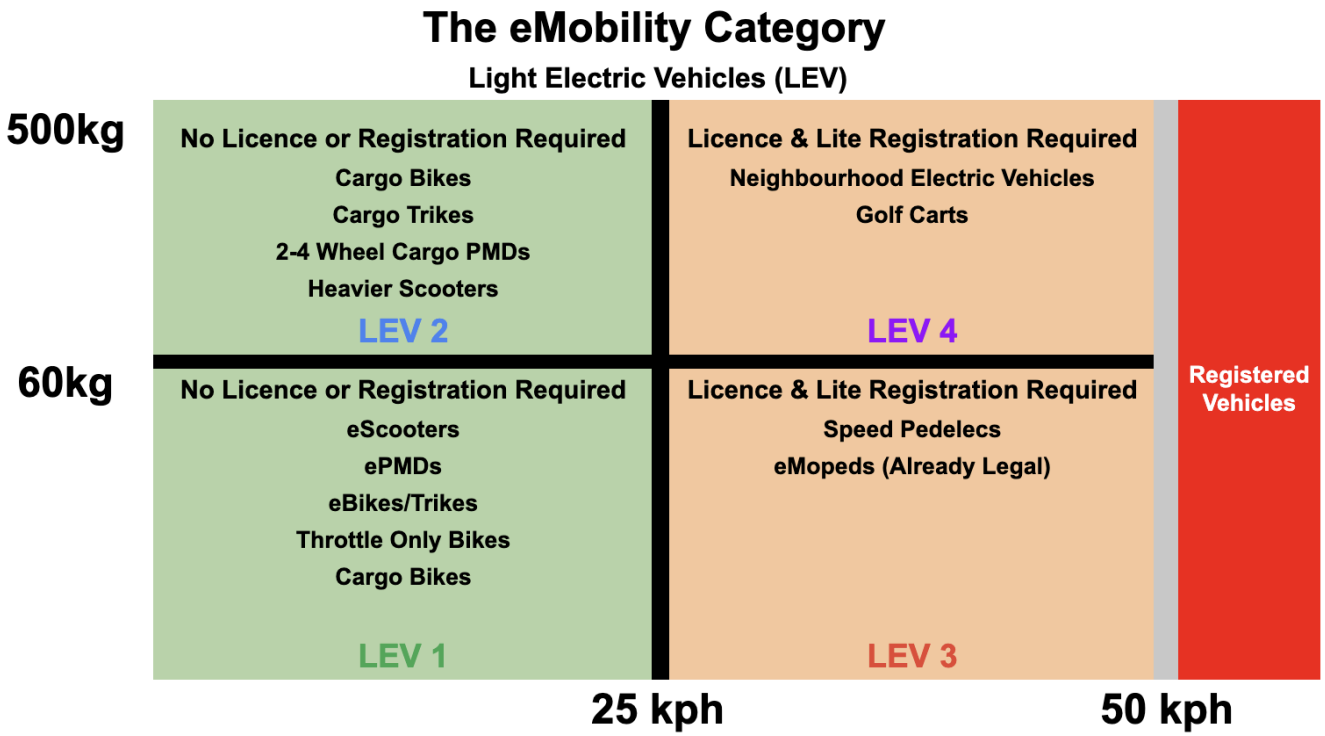
We recommend removing rigid vehicle dimensions and features as such regressive regulation compromises safety and innovation.

Irrespective of speed or weight, every e-mobility vehicle must have digitally verified certifications to the relevant product standards - this ensures quality and safety of vehicles to international standards.

The outcomes of this approach include:

- **Safety and quality managed and controlled across all vehicle styles and their batteries.**
- **Maximises e-mobility usage by permitting proven micromobility vehicles** in a parameter driven model, rather than regressive regulation that defines specific vehicle types and compromises safety and innovation.
- Classify various vehicle types within consistent and sensible operating environments.

The broad regulatory framework we recommend is:



The diagram on the following page sets detailed recommendations regarding importation, riding rules, areas of use, speed limits and recycling.

A full size version of this image [can be viewed at this link](),

Light Electric Vehicle Regulatory Requirements

	LEV 1	LEV 2	LEV 3	LEV 4
Weight Limit - Vehicle or Laden Mass	**60 kg**	**500 kg**	**60 kg**	**500 kg**
Speed Limit by Motor	**25 kph**	**25 kph**	**50 kph**	**40 kph**
Verified certifications to standards				
Digital Product Passport				
No length limit				

Vehicle Types Permitted (varies by State)	**Existing**	Pedelecs eScooters eCargoBikes eCargo Trikes eSkate Boards Various ePMDs	Larger Cargo Bikes Heavier e-scooters	Some eMopeds	
	New	Throttle e-bikes Throttle Cargo Bikes Throttle Cargo Trikes	Future Innovations	Speed Pedelecs	Golf Carts NEVs

Importation	LEV 1	LEV 2	LEV 3	LEV 4
Advisory Notice • Vehicle, Batteries & Chargers	**Compulsory**	**Compulsory**	**Compulsory**	**Compulsory**
Digitally Verfiied Certifications	**Compulsory**	**Compulsory**	**Compulsory**	**Compulsory**
Digital Product Passports	**Compulsory**	**Compulsory**	**Compulsory**	**Compulsory**
Battery Stewardship Levies	**State-based**	**State-based**	**State-based**	**State-based**

Riding Rules	LEV 1	LEV 2	LEV 3	LEV 4
Minimum Age	16	16	License Age	License Age
Helmet	Yes	Yes	Yes	Yes or Seatbelts
Licence	No	No	Yes	Yes
Registration	No	No	Lite	Lite

Areas of Use & Speed Limits				
•. Footpaths (where permitted by LGA)	12 kph	**Banned**	**Banned**	**Banned**
•. Shared Paths	25 kph	**Banned**	**Banned**	**Banned**
•. Bike Lanes	25 kph	25 kph	**Banned**	**Banned**
• Local Roads (Speed Limit up to 60 kph)	25 kph	25 kph	50 kph	40 kph
•. Other Roads	25 kph	25 kph	50 kph	40 kph
•. Freeeways	**Banned**	**Banned**	**Banned**	**Banned**

Recycling

Move to EU Sustainability Requirements
Carbon Footprint of Batteries
Recycling information integrated to Digital Product Passport for Owners & Recyclers

3. Supporting Regulation with Education and Enforcement

Even the best-designed regulations will fall short without:

3.1 Consistent Public Education

- Campaigns explaining **device legality**, **safe charging** practices, and proper **riding conduct**.
- Tools such as a **digital verification portal**, enabling riders to check device compliance.
- Standardised **safety fact sheets** and certification disclosures at retail points and online platforms.

3.2 Scalable and Smart Enforcement

- Empowered frontline enforcement officers with **digital scanning tools** to check certification and speed class in real time.
- Data-sharing agreements with shared operators for **rider behaviour monitoring** and penalties.
- Coordinated efforts with local councils, police, and fire services to monitor high-risk areas and behaviours.

Conclusion - A Unified Framework Built for Growth and Safety

Queensland can lead Australia by adopting a regulatory framework that is:

- **Aligned federally at the point of import**
- **Clear and enforceable at the point of use**
- **Built on verified certifications and safe designs**
- **Supported by digital traceability, public education, and scalable enforcement**.

This is not about restricting innovation, it is about making innovation safe, fair, and functional. Regulation must evolve from banning what doesn't fit old definitions to **embracing new solutions that meet community needs**, while ensuring those solutions are **safe, verifiable, and responsibly managed**.

Shared Operators of eMobility and Privately-Owned eMobility

Zipidi's report is primarily focussed on overall regulations of eMobility for Queensland - vehicle standards and riding rules. These are generally common for any e-bike, e-scooter or other e-mobility device.

There are some fundamental differences for shared schemes which we will briefly discuss here for context. Within the terms of reference responses, we will only mention shared operators separately in sections where it is relevant.

Shared micromobility programs differ fundamentally from privately owned e-scooters and e-bikes in their governance, safety technology, and regulatory compliance. Shared services are operated under formal agreements with local or state governments, subject to permit conditions, insurance requirements, and real-time data sharing.

Operators deploy a wide range of embedded safety technologies, including geofencing, speed controls, remote trip termination, helmet detection, and (in some cases) cognitive impairment testing, that are simply not available or enforceable on privately owned devices. It is critical that policy responses distinguish between these two models. Shared programs offer far greater opportunity to enforce safety standards, monitor rider conduct, and respond swiftly to incidents, and should be recognised accordingly in regulatory frameworks.

Some regulators in other Australian markets are considering embedding operator safety requirements directly into legislation or regulation.

While well-intentioned, this approach risks significant unintended consequences.

Safety technology is evolving rapidly, and codifying specific tools or standards in regulation may inadvertently stifle innovation, limit adaptability, and delay the deployment of improved solutions.

Zipidi recommends that operator safety obligations, including those related to cognitive testing, helmet detection, or tandem riding prevention, be addressed through tender processes and service agreements. This approach ensures that governments retain strong oversight and accountability mechanisms while allowing operators the flexibility to adopt and improve technologies in response to real-world performance and emerging best practices.

Shared Operator Safety Technology

Shared micromobility operators across Australia and worldwide are investing in advanced technology to keep riders and the broader public safe. Following the tragic death of a pedestrian in Perth in June 2025, the role of safety technology has come into sharp focus, both in terms of what is already in place and what further innovations can be deployed to prevent future incidents.

The Role of Technology in Preventing Harm

Technology is not a silver bullet — but it is a critical safety layer that can discourage or prevent some of the most dangerous rider behaviours. Operators are actively deploying or trialling a number of tools:

Onboard Cameras

Leading shared micromobility operators are now trialling and deploying onboard camera systems that use ai-assisted computer vision to detect pedestrians, pavement types, and prohibited riding zones in real time. These AI-enabled systems can identify whether a rider is operating on a footpath, entering a no-ride area, or approaching dense pedestrian activity, enabling the scooter to slow down, issue alerts, or even stop the trip automatically. This technology significantly enhances situational awareness and rider accountability, going beyond GPS-based geofencing by responding dynamically to the physical environment. As these systems mature, they offer a powerful new tool for improving rider compliance, protecting vulnerable road users, and enabling cities to better manage high-risk zones.

Zipidi supports the adoption of such innovations, provided privacy safeguards and regulatory permissions are appropriately addressed.

Cognitive Impairment Testing

Several operators now use cognitive reaction tests at journey start, especially in nightlife zones or during late-night hours. These are designed to detect behavior that may be caused by alcohol or drug impairment before the vehicle is unlocked.

Key issues

- Current tests can be bypassed if another (non-impaired) person takes the test on behalf of the rider.
- Some systems allow impaired riders to proceed after only receiving a warning, which is ineffective when intoxication limits cognitive function.
- Legal responsibility for these tests remains unclear. If a test fails to detect impairment, operators may be exposed to litigation. There has been legal precedent in other markets where a rider passed a test whilst intoxicated and later was involved in a severe crash. They went on to litigate against the operator for negligence in the delivery of the impairment test.

Zipidi’s Position

- If impairment tests are required, operators should block ride activation if impairment is detected.
- Governments and insurers should support a shared liability framework where tests are delivered by approved third-party APIs with indemnity for cities and operators. Operators are not experts in developing or delivering cognitive testing.
- Operators are willing to fund the use of such tools but cannot “own” the legal risk of inaccurate testing technology.

Tandem Riding Detection

Riding with a passenger is unsafe and prohibited on all shared e-scooters. Operators are investing in detection tools such as:

- Pressure sensors on decks to detect excess weight or foot placement.
- AI-driven camera analytics to flag tandem events.
- Sudden balance shifts captured through accelerometer data.

Key Issues

There are currently limitations with this technology. Whilst operators are developing improvements, detection is often not immediate, with notices sometimes provided to riders post ride.

Zipidi's Position

- As technology advances, when tandem riding is detected, operators should be able to end the trip remotely or issue an immediate ban.
- Local authorities should support enforcement by issuing fines or infringement notices for tandem riding.

Speed & Geofencing Controls

All shared scooters in Australia use GPS systems to cap speed, enforce no-ride zones, and enable slow-speed areas (e.g., pedestrian malls, parks, markets). These systems are improving, but challenges remain with GPS drift and urban canyoning.

Zipidi's Position

- Operators are committed to improving accuracy through advanced satellite tech and local mapping partnerships.
- Cities can support this effort by providing open-access, high-resolution geospatial data to enable better performance.

Helmet Detection

Some operators use on-board cameras, RFID technology or helmet lock/unlock sensors to verify helmet use.

Key Issues

Whilst technology is improving there is presently no 'at scale deployment' of reliable tests confirming continuous helmet use during the entire ride.

Zipidi's Position

- Education and community partnerships are essential, particularly for tourists and casual users.

Incident Reporting & Data Sharing

Operators collect and share incident data with cities under current MoUs and licensing frameworks.

Key Issues

There is presently no data standard for the collection and reporting of incident and injury data.

Zipidi's Position:

- We support standardised national reporting formats and shared databases to improve safety insights.
- Data privacy and commercial confidentiality must be respected.

Supporting a Safe Ecosystem

Safety technology is only as effective as the ecosystem in which it operates. For these tools to succeed, the following is required:

- Government support for regulation that allows (and does not penalise) the deployment of risk-prevention technology, such as cognitive testing.
- Insurance partnerships that recognise and incentivise the use of advanced safety systems.
- Fair and proportionate treatment of micromobility compared to other modes — recognising that the vehicle itself is not the cause of harm; misuse is.
- Education campaigns to complement enforcement, with a particular focus on impaired riding and night-time behaviour.

Conclusion

We urge all stakeholders, including cities, insurers, and state governments, to collaborate with operators to embed and test safety technology, define legal responsibility clearly, and create a national framework that supports innovation, enforcement, and shared accountability.

Safety is our collective responsibility. Through the right tools, partnerships and policies, we can deliver a micromobility system that is both safe and sustainable.

Introducing CREDZ: Digital Fingerprints and Product Passports for Safer, Smarter E-Mobility

As our submission addresses the issues and solutions set out in the Inquiry's Terms of Reference, we will frequently refer to digital fingerprints, digital product passports, and the CREDZ platform. This section provides essential background and context for those references.

Zipidi submits this response not only as a contributor to regulatory reform, but as a technology innovator and long-standing industry problem-solver. Over the past eight years, Zipidi has worked across Australia, New Zealand, Europe, and North America on the front lines of micromobility's emergence, including safety, compliance, import control, enforcement, insurance, and public trust challenges.

One lesson has become clear - **many of the most persistent problems in e-mobility stem from the inability to verify and trace the status of a product at the individual device level**.

- Is this device legal in Queensland?
- Has its battery been certified to international safety standards?
- Was it imported properly, and is it approved for public use?
- Has it been recalled?
- Can a rider, regulator, or retailer instantly know the facts?

Today, the answer to most of these questions is **no**. Devices enter the Australian market under self-declared claims, with no enforced link between their technical configuration, their certified status, or their jurisdictional legality. Regulators and police officers can't verify them. Consumers are misled. Legitimate businesses are undercut. And public safety is compromised.

The Solution: Digital Fingerprints and Product Passports

To address this, Zipidi developed **CREDZ®** — a **micromobility-specific digital verification platform** built on a world-leading Australian technology foundation.

At its core is **Laava Smart Fingerprints®** — a patented digital signature and authentication platform developed in partnership with the CSIRO. Laava enables secure, fraud-resistant tagging of individual products at the serial number level. Unlike static QR codes or barcodes, Smart Fingerprints are uniquely generated, cryptographically secure, and impossible to copy — making them ideal for anti-counterfeiting and compliance.

CREDZ builds upon this infrastructure to create a comprehensive **Digital Product Passport and Compliance Engine** designed specifically for micromobility.

What CREDZ Does

CREDZ enables any stakeholder — regulator, importer, retailer, enforcement officer, or consumer — to scan a device and instantly verify:

- **Device type, classification and technical specifications**.
- **Certification status**: including test reports, lab verification, and validity.
- **Battery chemistry, power limits, charging system, and BMS details**.
- **Legality of use in a specific jurisdiction** (e.g. Queensland vs NSW).
- **Import declaration status and compliance with local regulations**.
- **Product recalls.**
- **Ownership or service history (optional for second-hand markets)**.

This data is drawn from a secure, standards-based platform. CREDZ has already developed **open data specifications for e-bikes, e-scooters, ePMDs, lithium-ion batteries, vehicle certifications, and usage regulations**, making it a world-first solution tailored to the emerging demands of micromobility regulation and safety.

Why This Matters for Queensland

CREDZ addresses many of the core problems raised in this Inquiry:

Inquiry Issue	How CREDZ Helps
Illegal or non-compliant imports	Verifies compliance at serial number level and links to import data
Dangerous or uncertified batteries	Provides certification traceability and chemistry information
Enforcement gaps	Allows police to scan devices and confirm legality in seconds
Consumer confusion	Gives riders simple information on where and how the device can be legally used, charged, stored and disposed
Lifecycle and environmental traceability	Enables battery passport integration and end-of-life tracking
Regulatory misalignment	Can adapt to each jurisdiction's specific rules while using a common standard

By requiring a 21st century technology solution like CREDZ, Queensland can **ensure safer vehicles, more informed riders, and more effective enforcement**, while reducing the administrative burden on government and increasing confidence for industry and insurers.

A Micromobility Specific Response to Global Gaps

Digital Product Passports are already gaining traction in Europe for electronics, fashion, and batteries — but **no global solution exists yet for micromobility**. CREDZ fills that gap.

CREDZ is backed by:

- A leading Australian technology stack.
- Open data standards developed through cross-industry collaboration.
- Regulatory pilots already scoped with multiple government partners.

Zipidi's development of CREDZ is a direct response to **the gaps we've uncovered over eight years of industry experience**. Using expert platforms leveraging digital fingerprints and product passports can support core elements of Queensland's emobility regulation, including shared scheme compliance, retail transparency, and battery traceability, to future-proof its policy framework and protect Queenslanders.

Inquiry Terms of Reference Feedback

4.1 Benefits of e-Mobility

Terms of Reference 1: Benefits of e-mobility (including both Personal Mobility Devices (PMDs), such as e-scooters and e-skateboards, as well as e-bikes) for Queensland.

e-mobility, including e-bikes, e-scooters, e-skateboards, and other Personal Mobility Devices (PMDs), offers significant benefits for Queensland.

First and foremost, these devices provide a convenient and low-cost transportation option for short trips and first- and last-mile journeys. Currently, private cars dominate over 80% of all trips, even for very short distances.

Micromobility can help **reduce congestion and traffic** by shifting a portion of these short trips (around 30% of all journeys are under 5 km) from cars to lightweight electric devices. This mode shift eases road congestion, frees up parking space, and makes more efficient use of existing infrastructure. It also complements public transport by solving the “last mile” problem – for example, enabling commuters to ride an e-scooter to or from a train station.

Environmental and sustainability benefits are another key advantage. By replacing car journeys, e-mobility devices contribute to lower carbon emissions and improved air quality. Lightweight electric vehicles are far more energy-efficient for short trips than traditional vehicles. Industry research in the UK finds that e-scooters can serve as a genuine alternative mode of transport and *“have a valuable role to play in delivering… decarbonisation goals”* (TRL, 2023). Widespread adoption of e-mobility therefore aligns with Queensland’s climate and sustainability objectives. It can help reduce transport-sector emissions and support a transition to greener, smarter cities.

Micromobility also brings **economic and lifestyle benefits**. It creates new business opportunities and jobs, from device sales and maintenance to app-based rental services and tourism experiences. Queensland’s cities have already seen thriving e-scooter share schemes that boost local economies by facilitating tourism and greater access to local businesses.

For individuals, e-mobility devices provide an affordable transportation option with low running costs, expanding mobility access to those who may not own cars or are unable to drive (including younger people and those who cannot obtain a license). They also encourage **active travel** – for example, current e-bikes still involve pedalling, which can have health benefits for riders. In summary, if supported with sensible policy, e-mobility can deliver safer, cleaner and more convenient urban transport for Queensland, enhancing both economic vitality and quality of life.

4.2 Safety Issues Associated with e-Mobility Use

Terms of Reference 2: Safety issues associated with e-mobility use, including increasing crashes, injuries, fatalities, and community concerns.

Zipidi recognises that alongside benefits, there are serious safety concerns associated with the rising use of e-mobility devices. The rapid increase in the uptake of e-scooters and e-bikes has corresponded with a sharp rise in injuries, crashes, and community complaints. These trends reflect both growing use and a lag in regulatory and infrastructure adaptation.

Injury and Fatality Trends in Queensland

- **Emergency Department Presentations:** In Queensland, e-scooter-related emergency department cases rose from 691 in 2021 to 1,273 in 2023 — an 84% increase. Fractures, head trauma, and facial injuries are common.

- **Fatalities:** In 2024, **eight people died** in Queensland while using PMDs. These include both riders and non-riders struck or impacted by micromobility users. This represents 2.6% of Queensland road fatalities in 2024. So far in 2025 there have been 4 fatalities representing 3.1% of fatalities to 15 June, 2025.

- Detailed analysis of the fatalities and hospital presentations is required to understand the cause of the incidents. Were the PMD riders at fault, was it another cause? International research indicates that when PMD deaths occur around 90% of accidents involve a motor vehicle.

- The raw data also needs to be compared to the level of PMD activity. Is the increase in fatalities/injuries occurring at a faster or slower rate than the growth rate in usage? In Europe, micromobility growth is growing while the incidence rate of fatalities and injuries is decreasing as a proportion of rides.

- **High-Risk Factors:** Key contributors to these incidents include:

    - Excessive speed
    - Alcohol or drug-affected riding
    - Riding without a helmet
    - Tandem riding
    - Night-time use with poor visibility
    - Poor-quality or illegal vehicles lacking adequate brakes or lights.

These trends have raised concerns among the public, policymakers, and health professionals. Further work is required to look at the incidence rates of injuries and fatalities. In many markets the raw numbers are increasing with usage but the “incidence rate” is falling - the percentage of rides resulting in an injury or fatality. Analysis also needs to consider contributing factors to the injuries and fatalities - is it the eScooter or e-bike itself or is it the result of a poor or impaired car driver, bad rider behaviour, poor infrastructure or other factors.

Device Safety Deficiencies

Many incidents stem from the use of **substandard or illegal vehicles**:

- Devices not meeting quality or safety standards. Despite strong international standards existing, no Australian State has fully mandated safety certifications for eMobility products and related electrical components. While lithium-ion battery fires have made headlines, there are many crashes caused by poor quality materials and engineering that do not meet standards or abide by engineering quality to suit their speed and areas of use.
    - NSW Fair Trading have mandated some standards regarding electrical safety but made exceptions in some structural integrity and engineering areas.
- Small wheels (less than 10”) increase the risk of instability on potholes or uneven pavement.
- Inadequate lighting or reflectors reduce rider visibility at night.
- Weak brakes and substandard tires reduce stopping capacity and grip.
- Devices without tamper proof firmware speed caps are easily modified to exceed legal limits.

In markets without enforced certification, these problems are widespread. This underscores the need for **mandatory standards and enforcement**, particularly for battery and electrical safety, engineering quality, and mechanical design.

The standards referred to in this report for e-bikes, PMDs and batteries are extensive in their requirements and testing procedures. Beyond basic safety and engineering quality, standards cover issues like maximum acceleration rates, minimum declaration rates by brakes, lighting, audible warnings and more. This means governments do not need to specify these details in regulation if they mandate the adoption of standards, with digitally verified certifications by independent laboratories.

Environmental and Behavioural Risks

Beyond the vehicle, **rider behaviour and road/path design** contribute to crashes:

- **Footpath riding** is a major source of conflict with pedestrians, especially the elderly and visually impaired.
- **Speed mismatch** with vulnerable users on shared paths (e.g. bikes or scooters passing walkers at 25 km/h) increases collision risk.
- **Poor infrastructure** often forces micromobility users onto narrow, mixed-use paths or road shoulders, increasing conflict and confusion. Infrastructure can also force users from roads onto footpaths, if they do not feel safe.

As e-mobility becomes mainstream, planning must evolve. Safer, **separated infrastructure**, like protected bike lanes and slow-speed shared zones, is needed to reduce interaction risk.

Our Position

Zipidi supports a risk-based framework that addresses three interlocking factors:

1. **The rider**: Target unsafe behaviour through education, visible enforcement, and age restrictions.

2. **The vehicle**: Require all devices to meet minimum verified standards for mechanical, electrical, and software safety.

3. **The environment**: Design safe public spaces for micromobility – separated lanes, clear signage, and accessible parking.

Queensland can and should become a leader by embracing this balanced, evidence-informed model.

4.3 Ownership Risks: Fire, Battery, Storage and Disposal of Lithium-Ion Batteries

Terms of Reference 3; Issues associated with e-mobility ownership, such as risk of fire, storage and disposal of lithium batteries used in emobility, and any consideration of mitigants or controls.

The rise in private ownership of e-mobility devices brings with it serious safety concerns, particularly related to **lithium-ion battery fires**, unsafe charging behaviours, and the lack of proper disposal pathways for batteries at end of life.

Battery-Related Fires: A Growing Risk

Battery fires from e-mobility devices have become a **national and global public safety issue**. They often occur in homes, apartment corridors, stairwells, and garages, with catastrophic outcomes including:

- Fatalities and serious burns
- Destruction of residential buildings, commercial and sporting premises
- High public cost from emergency response and property damage.

Australia has already recorded **hundreds of battery fires linked to e-bikes and e-scooters** — with multiple incidents in Queensland including fatalities. e-Mobility battery fires are estimated to have cost Australia over $100 million in 2024 and the incidence is increasing. Notable contributing factors include:

- Use of **low-quality, uncertified battery packs**
- Charging overnight or in confined, unventilated spaces
- Inappropriate use of mismatched or aftermarket chargers
- DIY repairs and tampering
- Storage of multiple devices in multi-dwelling units without risk controls.

Queensland Fire and Emergency Services has identified e-mobility battery fires as an **emerging fire hazard category** in risk assessments.

The Certification Gap

At present, **Australia does not mandate third-party safety certification** for batteries in e-bikes and e-scooters or the devices themselves. Devices are often imported under general consumer product codes, without scrutiny of their quality, engineering specifications, battery management system (BMS), thermal protections, or cell chemistry.

In contrast:

- **UL 2271 (Batteries),UL 2272 (PMDs)** and **UL 2849 (e-bikes)** are mandatory in parts of the USA and Singapore. They are becoming mandatory nationwide in the USA in 2025.
- The **EU requires CE compliance**, and is moving toward stricter rules under the new **Battery Regulation (EU 2023/1542)**.

Without a verified certification regime, unsafe batteries continue to circulate in the Australian market, often sold online or through small retailers.

Zipidi's Proposed Solution

Zipidi advocates that States should mandate audited certification of all eMobility vehicles, batteries and chargers to the appropriate international standards. Zipidi would prefer the Federal Government manage this through the importation system, but until that occurs, Zipidi urges States to move down this pathway - using common international standards to aid future harmonisation of regulations.

Zipidi advocates for a three-part strategy:

1. Mandatory Safety Certification for All Device, Batteries and Chargers

- Three broad standards authorities exist worldwide with standards covering e-bikes, ePMDs, batteries and electrical systems. The main European/UK standards are designated as EN standards, US centric standards are designated UL and international ones from IEC. Each has nuances so the e-bike or e-mobility standards from the different organisations are not identical.

- While the tests required for each standard vary, all three standards set a much better minimum quality and safety standard than the current voluntary approach across Australia. As the standards improve over time and converge in terms of coverage, the bar will rise and make all emobility safer.

- A major advantage of mandating standards is that low quality manufacturers will not meet the standards and be forced from the market. They will focus their dangerous products in other less regulated markets.

- Quality manufacturers typically already manufacture to these standards and likely have certifications to prove their manufacturing standards meet safety and quality standards.

- Manufacturers should also be required to have the certifications to standards done by independent laboratories endorsed by Queensland. NSW has identified laboratories they recognise as reputable and independent. It makes sense for Queensland and other States to recognise the same laboratories for this testing.
    - Historically some certifications have been "self-declared", where manufacturers vouch for their quality. These types of certification should not be trusted. Only certifications by recognised independent laboratories should be accepted.

- Zipidi recommends that any e-bike, e-mobility device and related batteries and chargers meet one or more of the recognised standards for their product category.

  The specific standards identified by NSW Fair Trading and supported by Zipidi are:

e-Bikes	ePMDs	Batteries	Chargers
EN 15194:2017+A1:2023	EN 17128:2020	EN 50604-1:2016 +A1:2021	
AS 15194:2016; (until 1 February 2027)	AS/NZS 60335.2.114:2018 (until 30 November 2026) or AS/NZS 60335.2.114:2023	IEC 62133-2:2017; or AS/NZS 60335.2.114:2018 (until 30 November 2026); or	AS/NZS 61558 series or AS/NZS 60335.2.29

		AS/NZS 60335.2.114:2023	
UL 2849	UL 2272:2016 (until 1 February 2027); or UL 2272:2024	UL 2271:2018 (until 1 February 2027); or UL 2271:2023	

2. Digital Product Passport and Compliance Verification

- Digital verification of certifications is essential. Worldwide this is the missing step in most government's regulations.

  Governments typically regulate using 19th century printed labels as the "trust mark" to prove a product's compliance to standards and regulatory frameworks. **Traditionally printed trustmarks" are anything but trustworthy.** They are easily and regularly faked and misused. [Story about fake trust marks]

- A fraudproof digital fingerprint and product passport uses 21st century technology to overcome the problems of fraudulent printed trustmarks. A unique digital fingerprint can be added to any product at the serial number level. The digital fingerprint:

  - Links each device and battery at the serial number level to its certification files and specifications.
  - Checks the product's credentials against regulatory requirements for the location.
  - Can be scanned by consumers, retailers, and regulators.
  - Flags non-compliant or counterfeit devices.

- In 2023, the EU Commission legislated for digital product passports to be mandatory on batteries by 2027 and all products by 2030. The major manufacturers of products sold in Australia are the same manufacturers of products sold in Europe. They are already preparing to meet the EU Commission requirements.

  Australia and Queensland adopting 21st century digital verification requirements is not asking anymore than these manufacturers are already doing for Europe.

  Failing to make this a requirement, will make Queensland a dumping ground for non-compliant products with fake and untrue trustmarks, exposing Queenslanders to preventable and unnecessary dangers and risks.

3. Consumer and Stakeholder Education on eMobility Safety

eMobility and Lithium-Ion Battery Safety Needs a "Slip Slop Slap" Campaign

In 1980, Australia introduced the iconic "Slip Slop Slap" campaign to combat skin cancer by teaching people to slip on a shirt, slop on sunscreen, and slap on a hat. This simple, repetitive, and memorable message played a crucial role in reducing skin cancer rates by about 5% annually for decades. Today, a similar approach is desperately needed for eMobility and lithium-ion battery safety.

The Growing Threat of Lithium-Ion Battery Fires

In 2025, the world is witnessing an alarming rise in lithium-ion battery fires. With the average Australian home containing around 25 lithium-ion batteries—and similar numbers expected globally, fires sparked by faulty batteries are becoming a significant public safety concern. Governments and regulatory agencies are aware of the risks and have published safety advice. However, their messaging is often inconsistent, overly technical, and difficult for the average person to understand.

The Problem with Current Messaging

Across Australia, and in places like New York and the UK, various government agencies and industry organisations have rolled out safety tips for lithium-ion batteries. The core issue is that there is no unified voice. Different departments and manufacturers use varying words and formats to explain the same hazards, creating confusion among consumers. The language is often verbose, with key safety messages getting lost in technical jargon. This scattered approach contrasts sharply with the clarity and simplicity of the “Slip Slop Slap” campaign.

A Unified, Memorable Message for eMobility and Battery Safety

Drawing inspiration from Australia’s successful public health campaign, we propose a unified eMobility and lithium-ion battery safety campaign with the simple slogan: **eMobility Safety: Buy Safe, Charge Safe, Store Safe!** This clear and concise message is designed to cut through the noise and ensure that everyone—from tech-savvy adults to 12-year-olds—understands how to stay safe around lithium-ion batteries.

Buy Safe, Charge Safe, Store Safe

1. Use the Right Charger
Only use the charger that came with the battery

2. Stay Close and Awake
Stay close and never charge a battery while sleeping

3. Safe Surface
Charge batteries on things that won't catch fire

4. Charge Outside if You Can
If possible, charge your battery outside

5. No Broken Batteries
Don't charge a battery if it is broken or damaged

6. Cool Charging
Only charge your battery when it is cool

7. Safe Storage
Keep your battery in a cool, dry place, away from direct sunlight

8. Keep Exits Clear
Don't charge batteries where they block a way out

9. Unplug When Full
Unplug the charger as soon as the battery is full

10. Buy Safe Products
Only buy batteries and chargers that meet safety standards

A Call for Global Adoption and Feedback

Zipidi and eMobility Australia (Zipidi is a member) is making this safety framework available for industry adoption worldwide. The campaign isn't perfect yet, and we welcome feedback to refine the visuals and messaging further. Our goal is to achieve the same level of public health impact as "Slip Slop Slap" did for skin cancer, but now for eMobility and lithium-ion battery safety.

By working together and adopting a unified and memorable campaign, we can help reduce the risk of battery fires and create safer homes and communities worldwide. The "Buy Safe, Charge Safe, Store Safe" message is not just about preventing accidents, it's about building a culture of safety that keeps everyone protected in our increasingly battery-dependent world.

Battery Disposal and Recycling

Australia lacks a formal lithium-ion battery recycling system tailored to e-mobility. Risks include:

- Battery packs disposed of in household rubbish or kerbside recycling
- Explosions or fires at waste transfer stations and fires in garbage trucks
- Environmental damage from heavy metals and toxic electrolytes.

Zipidi supports:

- A **product stewardship scheme** for micromobility batteries
- Mandatory **take-back programs** via retailers and importers
- Public collection points for end-of-life batteries
- Use of CREDZ identifiers/digital fingerprints and product passports to **track batteries to end-of-life** and enforce extended producer responsibility (EPR).

Conclusion

Queensland's regulatory framework must urgently address the risks of lithium-ion battery fires, improper storage, and poor disposal practices. Digital tools, combined with international certification standards and education, offer a scalable solution to mitigate these threats, protect homes and communities, and promote safer private ownership of e-mobility devices.

4.4 Suitability of Current Regulatory Frameworks for PMDs and e-Bikes

Terms of Reference 4. Suitability of current regulatory frameworks for PMDs and ebikes, informed by approaches in Australia and internationally.

Queensland's current micromobility framework, while among the most progressive in Australia, now lags behind global best practice and is increasingly misaligned with market realities, safety needs, and innovation trends.

Achievements and Limitations

Queensland led the nation in legalising and regulating e-scooters and PMDs, setting foundational parameters including:

- Speed cap of 25 km/h
- 60 kg mass limit
- Use restrictions (e.g., footpaths, roads with speed limit ≤50 km/h)

However, the framework now faces multiple limitations:

- **Outdated size and form factor restrictions**: Many newer, safer vehicles exceed current mass or length limits (e.g., scooters with larger wheels, cargo scooters, seated PMDs).
- **No classification for higher-speed or heavier devices**: Devices exceeding 25 km/h, even if safely engineered, are automatically illegal, with no path to conditional use. Some devices over 60kg and limited to 25 kph or less have valid roles supporting personal transport and logistics.
- **Inconsistent treatment of throttle control**: Throttle-only e-bikes and PMDs, which are common globally, remain ambiguously regulated or prohibited, despite being widely used by delivery workers, tourists, people with disabilities and older adults.
- **Lack of verification at point-of-sale or import**: Compliance remains based on self-declaration rather than verified certification, enabling widespread sale of illegal or dangerous products.
- **Queensland's car-centric licensing regulations.** All licence types in Queensland require a car licence first, even if a person only intends to ride a moped limited to 25 kph.

A Tiered, Speed-Based Classification Framework

Zipidi proposes replacing the current binary legal/illegal approach with a **tiered classification system**, similar to the Transport Research Labs EU and UK recommendations:

Tier	Device Types	Max Speed	Requirements	Examples
Tier 1	Low-speed PMDs, e-bikes	≤25 km/h	No license/reg. Must meet verified safety and battery standards.	e-scooters,e-bikes, throttle-only bikes, e-trikes
Tier 2	Speed pedelecs, faster PMDs	26–50 km/h	Light license/registration. Mandatory insurance.	Speed pedelecs, Neighbourhood electric vehicles

This approach provides **regulatory certainty**, accommodates a range of use cases (commuting, logistics, accessibility), and reflects risk levels based on speed and weight.

Legalisation of Throttle-Only Devices ≤25 km/h

Zipidi strongly supports the legalisation of **throttle-only e-bikes and PMDs**, capped at 25 km/h:

- These devices are used by **elderly riders, people with disabilities,** unable to use pedal-assist **and delivery workers who are riding many hours a day.**
- They are legal and common in the USA, parts of the EU (e.g., Germany, France), and New Zealand.
- Safety is not inherently compromised by throttle control — risk correlates with speed, weight, and quality.

Regulations should focus on **outcomes (speed, stability, safety standards)**, not propulsion methods.

International Comparisons

Region	Framework Highlights
EU	EN 15194 for pedelecs (250W, 25 km/h); L1e-B category for speed pedelecs (up to 45 km/h); new battery passport law in force by 2027.
EU and UK TRL proposals	Light Zero Emission Vehicle (LZEV) category; tiered safety and data requirements; universal standards for shared/private. Focus on speed and "loaded mass" as key category determinants, rather than rigid dimensions or form factors. Require relevant standards and continue to upgrade standards to address all risks.
USA (CPSC)	Recently passed legislation requires UL 2271, UL 2272 or UL 2849 certification for batteries, e-mobility and e-bikes; 3-class e-bike system (Class 1–3) based on speed and control method.

These systems are converging on three principles: **certification, speed-based tiers, and electrical safety**.

Vehicle Form Factor Modernisation

The current Queensland PMD definition includes restrictions on:

- **Dimensions**: Max 1,250 mm long x 700 mm wide x 1350 mm high or 700 mm long x 1250 wide x 1350 high
- **Mass**: Max 60 kg

Modernisation should:

- Remove dimensions restrictions as they compromise safety and innovation
- Enable legal use of heavier vehicles for last-mile logistics, e.g. **cargo scooters -** 4 wheel scooters designed for logistics carrying Euro pallets as a standard form factor
- Align with safety outcomes, not arbitrary dimensions.

A broader and clearer definition of a Personal Mobility Device should be adopted, with allowances for innovation within safe parameters.

Certification and Type Approval

Current regulation allows for importation and sale based on **manufacturer self-declaration**, with no central registry or enforced type approval system.

Zipidi recommends:

- Requiring sellers/importers to submit certification documentation and be digitally verified by a service such as CREDZ.
- Enforcement of sales restrictions to certified-only products — both in stores and online.
- In the absence of a Federal database/website, establishing a **Queensland-recognised list of certified PMD/e-bike models**, similar to the Spanish website, https://www.dgt.es/nuestros-servicios/tu-vehiculo/vehiculos-de-movilidad-personal-vmp/

Digital Verification

To support enforcement and consumer confidence:

- All approved devices should include a **digital fingerprint**, linking to a compliance digital product passport with certification details.
- Fraudproof digital fingerprints that can be scanned by consumers, police, and regulators.
- Public lookup portals can ensure buyers only purchase legal, safe devices.

This is consistent with **EU digital product passport laws** and evolving global expectations for traceability and compliance transparency.

Queensland Licenses for e-Mopeds and Motor Bikes & Scooters

Reforming Licence Pathways: Remove Car Licence Prerequisite for Motorcycle Licensing

Under current Queensland legislation, individuals must hold a car (C-class) licence for at least 12 months before becoming eligible to apply for a motorcycle licence. While originally intended as a road safety measure, this requirement has become outdated and unnecessarily restrictive in the context of modern, low-speed electric mobility. Zipidi recommends that Queensland remove the requirement for holding a car licence prior to obtaining a motorcycle licence, aligning with the majority of other Australian states and territories.

Rationale for Reform

1. **Motorcycle Licensing Should Reflect Independent Transport Choices**
   Many Queenslanders—particularly young people, low-income workers, students, and new urban residents—have no intention of owning or operating a car. For these users, mandating a car licence is not just redundant, but counterproductive. Their transportation needs can be fully and safely met by e-mopeds, speed pedelecs, or similar low-speed electric vehicles.

2. **Cost Barriers and Access Inequity**
   Acquiring a car licence in Queensland requires 100 hours of supervised driving. For individuals without access to a vehicle or a licensed supervisor, this creates a significant financial burden—often requiring paid lessons that can cost several thousand dollars. This places safe and legal electric transport out of reach for the very people it could benefit most.

3. **Electric Micromobility Is a Viable, Low-Cost Alternative**
   E-mopeds, speed pedelecs, and neighbourhood electric vehicles offer a safe, practical, and affordable alternative to car ownership. They reduce emissions, congestion, and parking demand, especially in dense urban and coastal areas. These vehicle types are legal, regulated, and already in use worldwide. Ensuring equitable access to the licensing needed to operate them responsibly is essential.

4. **Harmonisation with Other Jurisdictions**
   Queensland is one of only three jurisdictions in Australia (alongside South Australia and the ACT) that still require a car licence before a motorcycle licence can be obtained. New South Wales, Victoria, Western Australia, Tasmania, and the Northern Territory all offer direct access to motorcycle learner permits without this prerequisite. Queensland's current model is out of step with best practice.

Recommendation

That Queensland revise its licensing regulations to:

- **Remove the 12-month car licence prerequisite** for obtaining a motorcycle learner licence.
- **Introduce an approved training pathway** (e.g. Q-Ride) for direct-to-motorcycle learners to ensure safety standards are upheld.
- **Enable early and affordable access** to light electric vehicles such as e-mopeds and speed pedelecs, especially for transport-disadvantaged groups.

Impact

This reform would support Queensland's broader goals of:

- Promoting affordable and sustainable transport
- Reducing congestion and emissions
- Encouraging safe, legal, and regulated use of emerging e-mobility technologies
- Supporting transport equity and choice in both urban and regional communities.

By removing an unnecessary and outdated barrier, Queensland can lead the way in enabling safer, smarter mobility for the future.

Conclusion

Queensland's current PMD and e-bike regulations were forward-thinking when introduced, but they now require **urgent evolution** to remain relevant and effective. By adopting a **tiered classification model**, expanding allowable vehicle types, mandating verified certification, and integrating digital verification, the state can create a modern, safe, and innovation-ready regulatory framework.

This approach supports accessibility, commercial use, and tourism while reducing injury risks, fire hazards, and illegal imports.

Further, allowing a licence suitable for speed pedelecs, e-mopeds and motor bikes without requiring a car licence will remove barriers to independent transport and accessibility for hundreds of thousands of Queenslanders.

4.5 Effectiveness of Current Enforcement Approaches and Powers to Address Dangerous Riding and Illegal Devices

Terms of Reference 5. Effectiveness of current enforcement approaches and powers to address dangerous riding behaviours and the use of illegal devices.

While Queensland has made progress in regulating e-mobility, the effectiveness of enforcement remains mixed — undermined by insufficient tools, and a growing number of non-compliant devices entering the market. Dangerous rider behaviours, illegal vehicle usage, and weak supply-chain controls all contribute to increased injuries and public concern.

Behavioural Enforcement Gaps

Despite formal rules on helmets, intoxication, and speed, the **actual enforcement on Queensland streets remains limited**. Challenges include:

- **Under-resourced police enforcement** of micromobility offences
- A perception that e-scooters are “low priority” relative to motor vehicles
- Lack of on-the-spot tools to verify the legality of a device
- **Ambiguity in laws** governing footpath use and rider conduct, leading to poor public understanding and inconsistent penalties.

Common infractions include:

- Riding illegal devices
- Riding without helmets
- Intoxicated riding
- Carrying passengers on single-user devices
- Riding on prohibited paths
- Excessive speed (especially downhill or via firmware tampering).

These behaviours are frequently reported by pedestrians, disability groups, and local councils, yet rarely result in deterrent enforcement.

Illegal and Non-Compliant Devices

Another major enforcement challenge is the proliferation of **non-compliant or illegal devices**, which are:

- Imported under false or misleading declarations (e.g. “off-road only”).
  Sold via online marketplaces or small retailers without oversight.
- Modified (firmware unlocks, aftermarket motors) to exceed 25 km/h.
- Lacking any certification or safety controls.

Once these devices are in use, they are **hard to identify or verify** visually, particularly for frontline officers.

Current enforcement relies on:

- Visual inspections
- Infrequent confiscations
- Reactive policing after crashes or complaints.

There is **no standard tool for law enforcement to verify compliance in the field**.

Zipidi’s Enforcement Recommendations

To address these issues, we propose a multi-layered enforcement strategy combining technology and regulation.

1. Introduce Digital Fingerprints

All legal devices sold or used in Queensland should be:

- **Registered in a certified model database** (with documentation of compliance to relevant standards).

- Fitted with a **digital fingerprint** linking to:

    - Certification status
    - Model specifications (speed, weight, power(where relevant))
    - Date of manufacture/import.

This allows:

- **Instant roadside checks** by police or authorised officers using a smartphone app
- Verification by consumers at point of sale
- Audits and recalls where needed.

This approach parallels vehicle VIN systems and is aligned with the EU’s **Battery Passport** initiative.

2. Increase Penalties and Visible Blitzes

To create deterrence:

- Raise penalties for high-risk behaviours (e.g. intoxicated riding, unhelmeted riding).
- Publicise enforcement campaigns — with visibility comparable to seatbelt or drink-driving efforts.
- Run targeted blitzes in known hotspots.

3. Extend Powers to Inspect and Seize Devices

Regulations should:

- Once digital product passports are in place, empower authorised officers (not just police) to inspect e-mobility devices for compliance.
- Allow seizure or immobilisation of illegal vehicles.
- Introduce/enforce penalties for retailers/importers knowingly selling illegal or dangerous models.

Conclusion

Enforcement cannot rely on visual checks and reactive policing alone. Without the ability to distinguish legal from illegal devices, or target the riskiest behaviours, Queensland's enforcement efforts will fall short, undermining public confidence and safety goals.

Zipidi proposes a **smart enforcement model** built on:

- Digital compliance tools
- Real-time data access
- Community education
- Scalable powers for inspection and deterrence.

This approach protects both responsible users and the wider community.

4.6 Gaps Between Commonwealth and Queensland Laws That Allow Illegal Devices to Be Imported and Used

Terms of Reference 6. Gaps between Commonwealth and Queensland laws that allow illegal devices to be imported and used.

A major structural flaw in Australia's micromobility regulation is the disconnect between **Commonwealth import laws** and **Queensland's road use rules**. This regulatory misalignment enables the **widespread entry and sale of non-compliant e-mobility devices**, which later appear on public footpaths and roads, posing serious safety, fire, and enforcement risks.

The Problem in Practice

- **Until July 2021, importers were required to lodge applications to import e-mobility through the Federal Department of Infrastructure's ROVER system.** This was not 100% effective, as importers "self declared" the products they were importing - little checking was done and there was no guarantee the vehicles in the shipping containers were the same as those self-declared on the Advisory Notice application.

- **The Federal Department of Infrastructure made Advisory Notices optional from July 2021.** This opened the floodgates as no pre-approval was required and little to no checking is performed by Border Force.

- **Importers can still elect to apply for Advisory Notices.** Quality manufactures are more likely to do this for risk mitigation or to get formal approval for a product slightly outside regulations.

- **Even so, these Advisory Notices are still based on self-declared compliance** with minimal verification via the Department of Infrastructure's ROVER system, under "non-road vehicle" advisory notices.

- These notices are not enforceable approvals, they are **informal acknowledgements** that a product is "not intended" for public road use, yet many such devices are used in public anyway.

- The **Australian Border Force (ABF)** and Department of Infrastructure do **not assess technical specifications** at point of import (e.g. motor power, speed limiter, weight, etc.).

- Devices are then **sold online or via retailers**, often marketed as "legal" despite breaching Queensland's limits on speed, throttle type, weight, or battery safety.

- **State police cannot detect the device's compliance status** without technical testing or manufacturer documentation, tools that are not available in the field.

This results in a regulatory paradox:

"Illegal to use, but legal to import, sell, and buy, and impossible to verify without lab testing."

Case Example

A Brisbane retailer sells a high-power throttle-only e-bike, marketed as suitable for “off-road or private property use only.” Yet no enforcement follows when it is ridden on city streets. No certification is required. The rider may be unaware the device is illegal to operate publicly, until an incident occurs.

Meanwhile, legitimate importers who invest in product testing and certification are **undercut by sellers of unverified products**, creating perverse incentives and undermining safety.

International Contrast

International jurisdictions are beginning to mandate certifications to international safety and quality standards such as those proposed by Zipidi in this document. Some examples are below.

All these governments have failed to require digital fingerprints and product passports to verify the authenticity of the claimed safety certifications. The EU Commission is the first government to mandate digital product passports - from 2027 for batteries and for all e-mobility vehicles by 2030.

Jurisdiction	Import & Certification Approach
EU	Requires CE certification and (for speed pedelecs) type approval under UNECE/EU Regulation 168/2013. Enforcement includes customs blocking of non-compliant models. The EU requires Digital Product Passports for batteries from 2027 and vehicles from 2030.
Singapore	All PMDs must be certified to UL 2272. Importers must register models and are liable for unsafe imports. Police conduct routine checks.
Spain	From January 2024, all e-scooters and PMDs must have specific characteristics specified in the Spanish legislation and be certified by specific nominated laboratories. These include 25 kph speed limit, anti tampering systems to prevent faster speeds, a minimum deceleration by braking of 3.5m/s, minimum wheel size of 203mm, lighting, horn, etc. Existing vehicles, which do not meet these requirements are permitted to continue to be used until January 2027.
USA	The US Congress has just passed legislation requiring mandatory UL 2271, UL 2272 and UL 2849 certification for batteries, e-mobility and e-bikes. Non-compliance will be a federal offence. The USA also removed the “de minimus” rule for e-mobility in April, which previously allowed items under $800 to be imported without quality and safety checks.

Implementation of Certifications & Impact on Existing Vehicles

Most countries that have brought in such certification requirements, provide a grace period where existing vehicles can continue to be ridden - typically 18 months to three years. Often government rebates and incentives are provided to trade in bad for good - in regard to e-bikes, e-scooters and lithium-ion batteries.

Zipidi's Recommendations

To close these regulatory loopholes, Zipidi proposes the following reforms:

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1. **Restore Advisory Notices as compulsory for all e-mobility and related lithium-ion batteries.**

2. **Mandate certifications for all e-mobility products and related core electrical components**

   The specific standards as identified by NSW Fair Trading are supported by Zipidi.

e-Bikes	ePMDs	Batteries	Chargers
EN 15194:2017+A1:2023	EN 17128:2020	EN 50604-1:2016 +A1:2021	
AS 15194:2016; (until 1 February 2027)	AS/NZS 60335.2.114:2018 (until 30 November 2026) or AS/NZS 60335.2.114:2023	IEC 62133-2:2017; or AS/NZS 60335.2.114:2018 (until 30 November 2026); or AS/NZS 60335.2.114:2023	AS/NZS 61558 series or AS/NZS 60335.2.29
UL 2849	UL 2272:2016 (until 1 February 2027); or UL 2272:2024	UL 2271:2018 (until 1 February 2027); or UL 2271:2023	

3. **Importers to be required to submit applications by Federal Government ROVER system and provide:**
   3.1. **Evidence of certifications to standards for each model to be imported**

4. **Digital verification of product certifications and specifications by expert regulatory technology system such as CREDZ**

5. **CREDZ verifies to ROVER if products meet requirements:**
   5.1. If no, ROVER hands off for manual review (as per current process)
   5.2. If yes, ROVER approves import and issues CREDZ digital fingerprints for approved products

6. **Importer prepares products for import, incorporating digital fingerprint and production/importation manifest at serial number to be provided digitally to ROVER** (other than digital fingerprint, manifests already are used for importation.)

7. Databases updated with approved products at the serial number level.

8. A **Public database of all approved models is updated (**Singapore and Spain already have such a public resource). The database identifies device legality on a state-by-state basis.

9. Imported products arrive with integrated digital fingerprints and product passports (as per EU regulations).

The Components of this Solution Already Exist - they just haven't been connected.

1. The Federal Government's ROVER system has been used for importation of all vehicles, including registered cars, motor bikes, etc. since 2020.

2. Quality Manufacturers already have certifications to quality and safety standards.

3. Quality manufacturers already have production and importation manifests at the serial number level with the required product information.

4. Quality manufacturers already have or are preparing for digital identification and product passports as they must do so to comply with European law from as early as 2027.

5. CREDZ digital verification system has been designed to verify certifications and specifications against verified databases and regulatory environments anywhere in the world.

Benefits of this Approach

1. **Every micromobility product has a digital fingerprint and product passport** scannable by any phone or dedicated scanner proving (or not) its regulatory compliance for its location (it respects State regulations and provides results for Queensland if the regulations are different to other States).

2. **Strengthens the ROVER System** and reinforces it as the sole method for approving all imports of e-mobility products and batteries to Australia.
    a. Digital fingerprints provide the trust and verification that Border Force is not able to provide.
    b. Digital verification of product certifications and specifications removes the "self declaration" process of ROVER which has been abused at scale.

3. **Any product sold in Australia or to Australia, must have a scannable digital fingerprint** to prove it is verified and permitted for Australia.
    a. This includes online marketplaces such as Amazon, Temu, eBay, etc. This closes a major loophole in current regulations.

4. **It enables Battery and Product Stewardship programs** for these products which are beginning to be implemented for safety and sustainability, e.g. NSW and Australia's Battery Stewardship Council.

5. **It enables accurate product recalls** when a product problem is identified.

6. **It brings micromobility into alignment with registerable road vehicles** in regard to voracity of importation and product traceability. This solution provides micromobility with the equivalent of a motor vehicle's VIN (Vehicle Identification Number), which every motor vehicle has. A MicroVIN would deliver the same benefits.

7. **It provides a common statewide system to manage government, regulations and customer service** throughout the State. This will benefit Queensland Police, Licensing, Vehicle Registration, Electrical Safety, Recycling and Consumer Affairs.
    a. It will enable digital enforcement tools, lacking today.

8. **It removes the difficulty for police to identify if a vehicle is legal.**

9. **It provides all Australians with a trusted method of identifying compliant vehicles**, being informed of safe riding and usage practices and supports more efficient data sharing with government and others as required.

10. **It delivers a National Approved Model Register,** a **public-facing database** of certified, compliant PMD, e-bike and battery models.

Enforcement Benefits of Closing the Gap

- Reduces volume of illegal or dangerous devices entering the community
- Makes enforcement simpler and more transparent
- Supports responsible importers and manufacturers who invest in safety
- Builds public trust and reduces risk of fire, injury, or misuse.

Conclusion

The current regulatory gap between Commonwealth import approvals and Queensland's (and other States') use laws is one of the **greatest threats to micromobility safety** in the state. It is also solvable.

By linking import conditions to local use laws, requiring verified certification, and creating a national registry of compliant models, Australia can eliminate this loophole and protect riders, pedestrians, and property.

States do not have the ability to do this in isolation - it will require States to collaborate with each other and the Federal department to influence this change.

Trials are possible within 12 months - political will to make change may take longer.

4.7 Communication and Education About Device Requirements, Rules, and Consequences for Unsafe Use

Terms of Reference 7. Communication and education about device requirements, rules, and consequences for unsafe use.

Clear, consistent, and proactive communication is essential to the success of any regulatory framework, especially when it affects fast-evolving technologies like e-bikes, e-scooters, and other PMDs. At present, many users, retailers, and even enforcement officers are unaware of the **legal requirements**, **compliance obligations**, or **safety responsibilities** tied to micromobility use in Queensland.

Current Communication Gaps

1. **Low consumer awareness of device legality**
    - Many riders believe their throttle-only e-bike or high-speed scooter is legal if it is being sold publicly.
    - Certification information is rarely visible at point of sale or online.
    - Certification labels are “wallpaper” and not understood by consumers.
2. **Misunderstanding of riding rules**
    - Helmet rules, speed limits, and footpath use permissions vary across jurisdictions and are poorly communicated.
    - Tourists and casual users are especially vulnerable to breaching rules unknowingly.
3. **Lack of education on battery safety**
    - Improper charging and storage practices remain common.
    - Users are unaware of the fire risks linked to second-hand batteries and uncertified batteries and chargers.
    - Many authorities and companies try to provide battery safety guidance - but there is no common language or structure to this information. It is not effective.
4. **Retailers not providing accurate guidance**
    - Sales staff often have limited understanding of local law.
    - Many online sellers omit compliance information altogether.
    - Many small retailers do not understand the law or the importance of safety and quality certifications.
    - Big box retailers are not aware of their obligations and are more motivated by moving stock.

These gaps increase the risk of **accidents, fires, fines, and public resentment**, all of which undermine the legitimacy and potential of micromobility.

The Case for a Proactive Education Strategy

Public education is not just about rule awareness, it's about building **a culture of safe and respectful riding**. It supports enforcement, fosters community acceptance, and enables better uptake of certified and sustainable products.

Zipidi's Recommendations for Communication and Education

1. Launch a Statewide Public Awareness Campaign

Develop a government-led but industry-supported campaign e.g. **"Know Before You Roll"** — that covers:

- What devices are legal to ride in Queensland
- How to identify a compliant device (via digital fingerprint or online Approved Product Register)
- Where and how you can ride (paths, roads, shared zones, speed limits)
- Penalties for dangerous or illegal riding (fines, confiscation, suspension from share schemes)
- Safe battery charging and disposal tips.

Delivery channels should include:

- Social media (Instagram, TikTok, Facebook) targeting younger riders
- Public transport advertising
- Shared e-scooter app integrations
- High-traffic websites (Service Queensland, news sites).

2. Introduce a Compliance Lookup Tool for Riders and Retailers

Enable users to scan or search a device model via a **CREDZ-powered portal or app** to verify:

- Whether it is certified and legal for use in Queensland
- What standards it meets (battery, EMC, structural)
- What its legal operating limits are (speed, throttle, rider age, path access)
- Safety warnings, recall notices, and recycling instructions.

This tool should be promoted in-store, online, and in law enforcement campaigns.

3. Require Retailers to Provide Standardised Compliance Information

Retailers (both physical and online) should be required to:

- Display a **standard fact sheet** with each device at point of sale, this information and more can also be provided by scanning the digital fingerprint.
- Include battery safety guidance with every purchase.
- All products must have digital fingerprints linked to the device's certification records.
- Warn customers if a device is **"Not legal for public use in Queensland."**

This requirement would:

- Shift liability away from uninformed consumers
- Reduce the sale of illegal products as only compliant products will have a digital fingerprint and digital product passports
- Improve trust in legitimate businesses.

4. Embed Rider Education in Shared Scheme Platforms

Shared scooter and e-bike operators are a key communications channel. Some operators already have some or all of these features. Permits should require:

- **Mandatory onboarding tutorials** for all new users (e.g. 90-second video or quiz).
- **Contextual prompts** in high-risk zones (e.g. “Slow down in pedestrian area”).
- Pop-ups or alerts for repeat safety issues (e.g. riding at night, riding without a helmet(if possible)).
- Rider safety ratings and rewards for good behaviour.

5. Deliver School and Community Education Programs

Micromobility safety should be integrated into existing **road safety education** in Queensland schools and TAFEs.

- Primary and secondary students should be taught:
    - Helmet use
    - Respectful footpath behaviour
    - Speed awareness
    - Environmental benefits of mode shift.
- Partner with road safety NGOs to offer community workshops in suburbs where private ownership is high.

6. Equip Local Governments and Police with Clear Materials/Tools

Provide consistent training and resources for:

- Citizen education materials to optimise “Place” issues and awareness
- Support LGAs with guidelines on local definitions for safe zones for riding e-mobility, areas of no-go zones and better support for parking requirements of private and shared e-mobility vehicles
- Support Police officers enforcing micromobility laws with digital enforcement tools
- Fire services responding to lithium-ion incidents.

These stakeholders often serve as **de facto educators**, and need accurate, easy-to-understand tools (e.g. pocket compliance guides, enforcement scanning apps, incident response cheat sheets).

Conclusion

Education is a **cornerstone of safe micromobility integration**. Without it, even the best-designed regulations and enforcement regimes will fall short. Zipidi urges Queensland to invest in clear, consistent, digital-first communication strategies that build trust, reduce misuse, and support safer product choices.

4.8 Broad Stakeholder Perspectives

Terms of Reference 8. Broad stakeholder perspectives, including from community members, road user groups, disability advocates, health and trauma experts, academia, the e-mobility industry, and all levels of government.

For e-mobility to succeed in Queensland, the regulatory framework must reflect the experiences and needs of **diverse stakeholders** — including pedestrians, health professionals, industry, councils, law enforcement, accessibility advocates, and the general public.

Zipidi has engaged with these groups through direct consultation, government forums, industry alliances, and product design. This section captures key stakeholder views and how a responsive framework can address their priorities.

1. Community Members and Pedestrians

Public sentiment is mixed. While many residents welcome e-scooters and e-bikes as a convenient, sustainable transport option, concerns are common:

- **Footpath safety** — especially in high-density zones with elderly pedestrians, people with disabilities, and children.
- **Cluttered or inconsiderate parking** of shared e-scooters.
- **Riders behaving unpredictably** — especially at high speed or without warning.

Zipidi supports these community expectations by recommending:

- **Clear footpath and shared path rules** (including default give-way requirements).
- **Geofenced speed zones** near pedestrian areas (e.g. 10–12 km/h). Shared mobility provides this technology. Privately owned eMobility is dependent on rider behavior in the same way as speed limits for cars must be controlled by drivers.
- **Designated parking zones** using virtual dockless systems (only shared operators can provide dockless parking systems). A common sense approach is to allow all forms of eMobility to use existing bike parking racks and facilities.
- **Audible alert mechanisms** for approaching PMDs in high foot traffic areas. Again this is largely rider behaviour. eMobility is required to have an audible warning horn or bell - it is up to the rider to use it.

Community members are more likely to support e-mobility when it is **predictable, quiet, and respectful**.

2. People with Disabilities and Accessibility Advocates

People with disability stakeholders have voiced two primary concerns:

- **Obstruction of access routes**, especially when e-scooters are left across footpaths or at kerb ramps.
- **Safety threats from fast-moving, silent vehicles** on shared paths — particularly for people who are blind, vision-impaired, or use mobility aids.

There is also growing interest in using **adaptive micromobility** (e.g. seated scooters, throttle-only e-trikes) as a tool for inclusive transport.

Regulations should:

- Permit **seated and multi-wheeled PMDs** that support independent mobility for older adults and people with disability.
- Ensure **enforceable parking penalties** for shared scooters left in inappropriate locations.
- Explore **audible signal options and educate riders to use audible warning** for PMDs and low-speed zones near aged care and health facilities.

Queensland should engage directly with people with disability organisations in shaping infrastructure and rules to ensure **micromobility inclusion does not undermine accessibility**.

3. Road User and Cycling Groups

Cycling and active transport advocates often support micromobility but seek:

- **Improved infrastructure** — particularly **protected bike lanes** to separate micromobility from both cars and pedestrians.
- **Clear user categorisation** to avoid tension between cyclists and faster-moving e-scooter riders.
- Action to reduce **sidewalk and road-edge conflicts**, which endanger cyclists and PMD users.

Zipidi supports these calls and recommends:

- Co-design of **"micromobility corridors"** with councils and cycling groups.
- Updated signage and rules to define **priority and behaviour norms** in shared zones.
- National data standards to include e-mobility in **active transport mode share targets**.

4. Health and Trauma Professionals

Frontline clinicians — especially emergency physicians and trauma specialists — have raised legitimate concerns:

- Incidence of **head trauma and fractures** from e-scooter and e-bike crashes.
- Low **helmet compliance**, especially among shared scheme users and tourists.
- **Night-time and intoxicated/impaired riding** associated with more severe injuries.

While many health professionals cite the high risk of head and other injuries, based on percentage increases, Their analysis frequently does not compare this to increased usage and that the percentage of rides resulting in an injury is a small fraction of 1% and reducing as an "incidence rate" - safety levels are improving. Analysis also typically fails to look at the relativity of injuries from e-scooter riding , compared to other activities which in many cities have higher injury rates. New Zealand has better data on this and this article by Zipidi is an analysis of comparative risk between modes of active transport.

Data from Europe, the most mature micromobility market in the world, shows that while usage is increasing, injuries and crashes are reducing as a percentage of rides ridden. Between 2021 and 2024, the number of fatal injuries or serious injuries requiring medical treatment while riding an e-scooter dropped by 29.8% per million km. See this article from MicroMobility for Europe.

Zipidi agrees that the framework must:

- Maintain and enforce **mandatory helmet laws**
- Mandate **brake lights, reflectors, and front/rear lighting**
- Require **shared operators to disable access or reduce speed at night** where appropriate
- Support public health campaigns to improve safe riding and discourage intoxication.

In 2022, Zipdi proposed to the Australian Automobile Association (AAA) a project to develop an open data specification for crashes and injuries to all vulnerable road users. This is lacking worldwide. There is no common framework for reporting and categorising crashes involving vulnerable road users. In most jurisdictions, first responders, police, doctors, hospitals and road safety organisations fail to have a common data reporting framework. As a result, data is sparse, unreliable and not comparable to other modes or other locations.

We have attached in Appendix C, our proposal for an Open Data Specification for Vulnerable Road uses and encourage this Parliamentary Inquiry to support this approach. Zipidi and our partners remain committed to deliver this vital information service should funding to support our work be provided.

5. Academia and Policy Researchers

Academic and research stakeholders consistently advocate for:

- **Data transparency** from shared scheme operators and retailers
- Consistent **evaluation of trial outcomes** and policy impacts
- Use of **evidence-based design standards** over arbitrary restrictions.

We endorse these requests and encourage Queensland to:

- Fund an ongoing **e-mobility regulatory observatory**. This could be the Queensland eMobility Centre of Excellence proposed elsewhere in this report.
- Require **trip and crash data sharing** (with appropriate privacy safeguards) from operators.
- Pilot innovations like AI speed detection, connected vehicle integration, and adaptive infrastructure in partnership with universities.

6. e-Mobility Industry and Retailers

Industry wants:

- **Clear and consistent rules** that reduce regulatory ambiguity and enable investment.
- Protection from **non-compliant competitors** selling unsafe products without penalty..

Zipidi's recommendations directly address these concerns:

- Require **verified certification for all devices** and **enforceable product safety standards**.
- Provide a **CREDZ-linked compliance database** to allow responsible importers to demonstrate due diligence.
- Create a **level playing field** through harmonised rules and retailer responsibilities.

7. Local Government

Councils face practical management challenges:

- Managing **shared scheme permits**
- Responding to **community complaints** about footpath use and parking
- Addressing infrastructure needs with **limited resources**
- Navigating **legal liability concerns** around injury and device failures.

Zipidi supports:

- **A state led eMobility Centre of Excellence** which manages shared mobility operations throughout the State with LGAs responsible for “Place” issues, areas of use, parking, no-go zones, etc.
    - LGAs do not have the skills, expertise or resources necessary to manage shared mobility operations. Their expertise is locally with “Place” issues.
    - Of Queensland’s 78 LGAs, few beyond Brisbane are equipped to manage the strategy, implementation and operations of shared mobility. It will be a barrier for many smaller LGAs to even offer such a service and result in a mish mash of operating models.
    - A state-led model with LGAs providing place expertise is a much better model for safe, sustainable and successful shared emobility.
- Shared scheme **performance scorecards, leveraging a common data reporting platform and framework,** to guide renewal or termination decisions.
- Investment in planning tools and education resources for local use. Zipidi has worked with LGAs and developed such materials.

8. State and Federal Agencies

Transport and consumer safety regulators across states and the Commonwealth are looking for:

- **Consistency across jurisdictions** to avoid patchwork regulation
- Clear delineation of roles between import approval (federal) and usage regulation (state)
- Reliable tools to **verify compliance at scale** — without creating administrative burden.

Zipidi has designed the **CREDZ system digital passport** to directly meet these needs. We advocate for:

- Creation of a **national compliance framework**
- Interoperability between CREDZ, ROVER, and state enforcement systems
- Digital traceability and enforcement by 2027, aligned with the EU’s Battery Passport framework.

Conclusion

No single stakeholder group can shape e-mobility policy alone. A collaborative approach is essential, one that enables access, prioritises safety, encourages innovation, and builds trust.

Zipidi has engaged with all of the above groups and integrated their perspectives into the design of our systems and policy positions. We urge the Queensland Government to establish an eMobility **Centre of Excellence** to ensure these voices remain embedded in regulatory development and oversight. The Centre of Excellence should include representatives from TMR, LGAs, Industry Experts, Police and Health Professionals.

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5. Key Recommendations

To position Queensland as a national leader in safe, inclusive, and innovation-friendly micromobility, Zipidi offers the following structured policy recommendations, aligned to the Terms of Reference and global best practices:

5.1 Device Classification and Regulation

- **Introduce a two-tier classification system** based on speed and weight:
    - **Tier 1:** ≤25 km/h – No license or registration; includes throttle-only devices.
    - **Tier 2:** 26–50 km/h – Treated as speed pedelecs/mopeds; require registration, light license, insurance.
    - These speed limited groups would be split by those under and over 60 kg.
    - These groupings determine areas of road use, licensing, registration and insurance requirements.
- **Modernise PMD definitions** to allow:
    - Remove vehicle dimensions from definitions - these compromise both safety and innovation. Governments only specify dimensions and weights for cars in relation to road standards. They don't seek to make every car as small as a Fiat 500.
        - Areas of usage can be used to limit access, if required. For example, a shared pathway may choose to be limited to vehicles no more than 800 mm wide (this is the width of Euro pallet - as standard width of container used for last-mile logistics delivery).
    - Focus on progressive regulatory frameworks to encourage innovative new vehicle types that support more use cases and citizens.
- That Queensland revise its licensing regulations to:
    - **Remove the 12-month car licence prerequisite** for obtaining a motorcycle learner licence.
    - **Introduce an approved training pathway** (e.g. Q-Ride) for direct-to-motorcycle learners to ensure safety standards are upheld.
    - **Enable early and affordable access** to light electric vehicles such as e-mopeds and speed pedelecs, especially for transport-disadvantaged groups.

5.2 Certification and Safety Standards

- Mandate **verified third-party certification** of all PMDs, e-bikes and batteries to recognised standards
- Require digital verification of the authenticity of claimed certifications.
- Require all products to have digital fingerprints and digital product passports with a sunset clause for existing products of 31 December, 2027.
- Establish a **Queensland-recognised register of compliant devices**.

5.3 Import Control and National Alignment

- Align federal import rules with Queensland usage laws:
  - Link ROVER declarations to actual state-legal use cases.
  - Require importers to upload certification documentation before approval.
- Establish a **National Approved Model Register**, accessible to police, retailers, and the public. It should be able to be sorted at the State level for compliance, riding rules and safety information.

5.4 Enforcement and Compliance Tools

- Introduce **CREDZ digital compliance IDs** for all certified vehicles and batteries.
- Equip enforcement officers with digital enforcement tools.
- Partner with shared operators to penalise unsafe riders.

5.5 Fire and Battery Risk Mitigation

- Require certified batteries and chargers.
- Promote **safe charging guidelines** and building regulations for storage in multi-unit dwellings.
- Create or extend a **battery recycling and stewardship scheme** for e-mobility batteries.

5.6 Education and Awareness

- Launch a **statewide campaign** (e.g. “Know Before You Roll”) to explain rules, penalties, and safe practices.
- Mandate **compliance fact sheets physically or via digital fingerprint scans** at point of sale and on online marketplaces.
- Integrate **rider education modules** in shared mobility apps.

- Build a public **device compliance lookup tool**.

5.7 Infrastructure and Local Government Support

- Fund expansion of **protected micromobility corridors** and slow-speed zones.
- Create enforceable **designated parking areas** for shared scooters.
- Provide resources for councils to manage permits, risk, and infrastructure demand.

5.8 Stakeholder Collaboration

- Establish a **Queensland Micromobility Centre of Excellence** with representatives from:
    - Department of Transport and Main Roads
    - LGA representatives
    - Industry Experts
    - Health and trauma experts.
    - Disability and accessibility groups.
    - Share operators
    - Academia
    - State enforcement and fire services.

5.9 National Policy Leadership

- Work with other states to:
    - Harmonise definitions, standards, and enforcement.
    - Develop a **national micromobility compliance framework**.
    - Promote digital fingerprints and product passports and traceability by 2027.

6. Conclusion

Queensland now has a unique opportunity to lead Australia, and align with international best practice, by building a micromobility regulatory framework that is:

- **High quality with innovative vehicles** which meet more use cases and have digitally verified safety and quality certifications**.**
- **Safe and evidence-based**, addressing injury risks and battery fires.
- **Inclusive**, supporting all ages, abilities, and transport needs.
- **Future-ready**, accommodating new form factors and digital compliance tools.
- **Nationally and globally consistent**, aligned with EU, UK, Singapore, and US approaches.

The public, industry, and regulators are ready for progress. Queenslanders want safer streets, cleaner transport, and innovation that works in harmony with public space.

Zipidi stands ready to support:

- Trial implementation of compliance and verification tools, including a Federal import tool for digital verification.
- Industry and Stakeholder Data sharing
- Co-design of education materials and standards frameworks.

We encourage the Inquiry to seize this moment. Through smart reform, Queensland can create a safe, modern micromobility system that benefits everyone — and becomes a model for the rest of Australia.

7. Further Recommended Reading

Zipidi has been working worldwide in this micromobility industry since 2018 and in new mobility since 2013. Our work on this submission is informed by our worldwide experiences and some of the other experts in this field.

There have been some recent reports which provide significant evidence and examples of the key issues we discuss in this submission. Australian Governments do not need to reinvent research - there is high quality detail research available addressing the common issues. We provide an overview and links to these reports below:

Safer Micromobility, Mar 2024, International Transport Forum, **OECD**
The ITF's 2024 Safer Micromobility report delivers the latest global evidence on crash risks, injury patterns, infrastructure impacts, rider behaviour, and the critical role of regulation and vehicle design. It offers practical, data-driven recommendations for governments, operators and industry to improve safety without undermining the health and sustainability benefits of micromobility. Download Here.

TRL - EC Study Aug 2024

The need for harmonised rules to support micromobility. **The document is a comprehensive study exploring the regulatory landscape for personal mobility devices in Europe, aiming to provide recommendations for harmonised rules** to improve safety and support the growth of micro-mobility. Download here.

TRL UK Study, Nov 2024

Technical research into construction standards for e-scooters. **This report provides a detailed analysis and set of recommendations to inform the development of technical regulations for e-scooters in the UK, covering aspects of safety, accessibility, and sustainability**. Download here.

POLIS March 2025 - Shared Micromobility Regulations Report

"Careful what you wish for... Practical implications of rules and requirements for shared micromobility" This POLIS report explores the real-world challenges of regulating shared e-scooters, e-bikes, and e-mopeds in European cities, focusing on six key areas: speed limits, parking, helmets, user education, local jobs, and environmental impact. Download here.

About Zipidi and the Authors of this Submission

Zipidi is at the forefront of cutting-edge micromobility advancements, ensuring seamless integration of technology, regulatory compliance, insurance and strategic planning to revolutionise urban transportation and foster sustainable and efficient mobility solutions.

Since 2013, Krystyna Weston and Stephen Coulter have been bringing their financial services expertise to the global mobility industry. They have worked and lived around the world including Mexico City, one of the most congested cities in the world.

Having engaged with Cities, Regulators, Manufacturers and Operators in diverse regions, including Australia, New Zealand, the UK, the USA, Canada, the Middle East, Europe, and Africa, Zipidi possesses unparalleled expertise in the ever-evolving micromobility market.

Krystyna and Stephen are co-founders and Directors of Zipidi. We also work widely on industry issues with Krystyna Chair and Stephen Head of eMobility Australia.

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Appendix A - Comparative Analysis of e-Bike, e-Scooter, and Li-ion Battery Safety Standards

E-Bike Safety Standards (UL vs EN vs IEC)

Electric bicycle (e-bike) safety standards differ in scope and rigor between the U.S. (UL standards), Europe (EN standards), and international bodies (IEC/ISO). **UL 2849** is the premier system-level standard in the U.S., covering the entire electrical drive system of e-bikes (battery pack, charger, motor/controller). **EN 15194:2017** (and its 2023 amendment) is the European standard for *Electrically Power Assisted Cycles (EPACs)*, focusing on pedelec (pedal-assist) e-bikes. There is no single IEC standard exactly equivalent to UL 2849; instead, international compliance relies on a combination of standards (e.g. IEC battery and charger standards and ISO bicycle requirements). Below we compare their scope, testing requirements, and enforcement.

- **Scope:** UL 2849 has a broad scope encompassing the **entire e-bike electrical system**, including batteries, drivetrain, and charger integration. In contrast, EN 15194 has a **narrower scope**, applying only to pedal-assist bikes with limited speed/power, and it leans more on mechanical and functional safety (since it is harmonised under the Machinery Directive). EN 15194 defers detailed battery safety to separate battery standards (previously allowing IEC 62133 testing, now mandating EN 50604-1 for batteries). The IEC/ISO framework for e-bikes is fragmented: there is *ISO 4210* series for bicycle mechanics and a technical specification *ISO/TS 4210-10:2020* for EPAC requirements, but **no dedicated IEC electrical safety standard** covering the whole e-bike system equivalent to UL 2849. This means international compliance is typically achieved via general standards (IEC 62133 for cells, IEC 60335 for chargers, etc.) rather than one holistic standard.

- **Testing Rigor:** UL 2849 is rigorous on **fire and electrical safety**. It includes requirements like **flammability tests for plastic enclosures** (materials must self-extinguish within specified time) to slow fire propagation and it mandates that the battery pack used is certified to appropriate battery safety standards (e.g. UL 2271). The UL tests cover **electrical shock protection, short-circuits, overcharge, thermal runaway containment, and charger/battery compatibility**. EN 15194's original electrical safety provisions have been weaker – notably, **EN 15194 lacked any flammability or fire propagation tests** for e-bike components. Its focus has been on ensuring the bike's assist system meets performance limits (25 km/h, 250W in EU) and basic electrical requirements, while referring to battery standards for battery-specific tests. With EN 15194:2017+A1:2023, the battery testing clause was strengthened to require compliance with **EN 50604-1:2016+A1:2021**, a dedicated battery safety standard. This greatly improves fire and abuse testing for the battery (covering overcharge, short-circuit, crush, etc.), addressing a past gap where just IEC 62133 (a cell-level test) could be used. Still, **UL 2849 is considered more comprehensive** in addressing all electrical hazards (it even covers high-power systems beyond pedelec limits). The lack of any unified IEC e-bike system standard means testing rigor internationally depends on which standards a manufacturer chooses (leading to potential gaps if only minimum requirements are followed).

- **System vs Component Coverage:** UL 2849 takes a **system-level approach**, evaluating the e-bike's entire electrical assembly as an integrated unit. This ensures that the **battery, battery management system (BMS), motor controller, wiring, and charger work safely together**, and it requires critical components (like the battery pack) to be certified to their own UL component standards for safety. EN 15194, on the other hand, is more of a **component-based approach combined into one standard** – it covers the bike's electrical assist system conceptually, but specific components like the battery must separately meet their own standards (EN 50604-1 for the battery, and applicable charger standards). In practice, an EPAC manufacturer follows EN 15194 for the overall bike and uses IEC/EN 62133 or 50604-1 for the battery and EN/IEC 60335-2-29 for the charger, etc. The IEC/ISO approach is similarly componentised. This means UL's standard provides a **more integrated assessment of the entire system's safety**, whereas EN/IEC rely on assembling compliant components (which can leave integration risks, like charger mismatches, less examined at the system level).

- **Certification and Enforcement:** UL standards are voluntary consensus standards in the U.S., but compliance is increasingly enforced via indirect means. **OSHA's NRTL program** adopted UL 2849 for workplace safety in 2021, and the **U.S. Consumer Product Safety Commission (CPSC)** has strongly warned importers that e-bikes not conforming to UL 2849 pose an unreasonable risk. In New York City, a law took effect in 2023 **banning the sale of e-bikes that are not certified to UL 2849 by an accredited lab**. Other jurisdictions and retailers are following suit, effectively making UL 2849 a **de facto mandatory standard** for e-bikes in the U.S. (even though federally it's still "voluntary"). In the EU, EN 15194 is a harmonised standard under the Machinery Directive, so compliance gives a "presumption of conformity" in terms of legal requirements. It is widely used for CE marking of e-bikes in Europe (and adopted in the UK as BS EN 15194). However, due to safety concerns (like the Dutch objection regarding battery safety), the harmonisation status of the battery clause was temporarily withdrawn until the new amendment was issued. Now manufacturers have a transition period until 2025 to use the updated standard with EN 50604-1. Enforcement in the EU and UK comes via market surveillance – unsafe products (e.g. with battery fire risks) can be recalled or stopped if they don't meet the general safety requirements, even if they had formally followed an outdated standard. The **IEC/ISO standards** are purely voluntary; there is *no global regulatory regime* that directly enforces an IEC e-bike standard. Instead, countries either adopt these into national standards or regulations. For example, some countries in Asia have adopted EN 15194 (Singapore requires e-bikes to meet EN 15194 for on-road use) or UL standards (New South Wales, Australia accepts UL 2849 as an option for compliance). Generally, **UL 2849 enjoys increasing acceptance in North America and parts of Asia**, while **EN 15194 is accepted in Europe, UK, and regions following EU bike regulations**. Enforcement is strongest where specific laws reference these standards (NYC, Singapore, NSW, etc.), otherwise it relies on voluntary compliance and post-market safety actions.

Zipidi Scorecard – e-Bike Electrical System Standards (Out of 100):

- **UL 2849 (USA/ANSI standard)** – *Rating: 90/100.* **Fire Prevention:** Strong fire safety focus (e.g. flammability requirements for enclosures to limit fire spread and thorough battery thermal runaway testing). **Verification:** Requires third-party certification (NRTL), providing high confidence; UL certification involves rigorous testing, not just design to standard.

System Integration: Excellent – covers the entire system and ensures all components (battery, charger, motor) work safely together. **Enforcement:** Partially mandated (NYC law and forthcoming CPSC rule), but still voluntary in many places – this knocks the score down slightly from perfect. **Consumer Safety:** Proven to significantly reduce fire and shock hazards. *Missing to reach 100:* At the time of writing, UL 2849 (Edition 1, 2020) lacks some of the newly identified safeguards (now being addressed) – e.g. explicit **tamper-resistant battery enclosures** to discourage unsafe DIY repairs, and **interlocks to prevent use of incompatible chargers**. These improvements, recommended by CPSC, are in progress but not yet in the published standard. Wider adoption/enforcement is also needed for full marks.

- **EN 15194:2017+A1:2023 (EU standard)** – *Rating: 75/100.* **Fire Prevention:** Moderate – addresses basic electrical safety but notably lacked fire propagation tests (no flammability requirements). Recent amendments improve battery safety by mandating testing to a stringent battery standard (EN 50604-1), which will help with thermal runaway prevention. **Verification:** Typically self-declared via CE marking; third-party testing is not mandatory, so compliance relies on manufacturer diligence. **System Integration:** Fair – ensures the assist system meets functional safety limits, but many critical aspects (battery, charger) are handled in separate standards, and *non-pedal throttle e-bikes or higher powered bikes fall outside scope*. **Enforcement:** High in EU via required compliance for market access (legal framework), but historically some gaps (e.g. battery not fully covered until now, meaning enforcement depended on general safety law). **Consumer Safety:** Generally good for its intended scope (EPACs), but some hazards were not fully addressed (e.g. plastic enclosure flammability, charger misuse). *Missing to reach 100:* EN 15194 needs broadened scope and tests to match UL's coverage – for example, adding **fire propagation tests**, covering *all* e-bike types (not just pedal-assist <25 km/h), and ensuring **compatibility between battery and charger** to prevent fires. Stronger third-party certification mechanisms would also increase confidence. Integration of these elements would raise safety to the level of UL's program.

- **IEC/ISO Standards (International)** – *Rating: 65/100.* (No singular standard – rating reflects the patchwork of applicable standards.) **Fire Prevention:** Variable – manufacturers can choose compliance paths. IEC 62133 (for cells) offers only basic abuse tests; without something like UL 2849 or EN 50604, critical system-level fire tests may be absent. **Verification:** Low – no unified certification unless a country mandates one. **System Integration:** Poor – no unified standard means the "system" safety is only as good as the sum of parts. For instance, a company might certify the battery and charger separately to IEC standards, but that may not ensure they are safe when combined (e.g. no rule to prevent a higher-voltage charger from connecting to a lower-voltage pack). **Enforcement:** Minimal globally, aside from national adoptions. **Consumer Safety:** Inconsistent – products might meet only bare-minimum cell safety tests or, at best, a mix of standards. *Missing to reach 100:* The IEC environment currently lacks a dedicated e-bike electrical safety standard. A comprehensive international standard (or harmonized set) covering **battery, charger, and motor controller as an integrated system with fire mitigation** is needed. Until then, important risks (thermal runaway containment, interoperability) may slip through. In practice, this gap is being filled by either adopting UL or EN standards or developing new ones in IEC – for example, an ISO/IEC standard could be developed to mirror UL 2849's provisions.

e-Scooter and Personal e-Mobility Device Standards

"e-scooters" and other small personal electric transporters (like hoverboards, electric skateboards, unicycles) have their own safety standards. **UL 2272** (U.S.) and **IEC 60335-2-114:2022** (international) focus on electrical system safety for these devices, while **EN 17128:2020** is the European standard covering personal light electric vehicles (with more emphasis on mechanical and usage aspects). Below is a comparison of these standards:

- **Scope:** UL 2272 is the *Standard for Electrical Systems for Personal E-Mobility Devices*, created initially in response to hoverboard fire incidents. It covers e-scooters, self-balancing scooters, e-skateboards, and similar devices (generally, one or two-wheeled personal transporters). It evaluates the entire electrical drive system, including the lithium battery pack, wiring, controls, and charger interface. IEC 60335-2-114:2022 is an international standard that similarly deals with the **electrical safety of personal e-transporters** (e.g. e-scooters, skateboards, hoverboards) used in private or public areas. Notably, IEC 60335-2-114 explicitly **excludes electric bicycles** from its scope, since those are handled by bicycle-specific committees. EN 17128:2020 covers "personal light electric vehicles" but is largely concerned with operational safety (stability, braking, lighting, etc.) and is **not as detailed on battery/electrical fire safety**. EN 17128 applies to devices like e-scooters, but excludes rental fleet scooters and focuses on construction and performance requirements (many of them mechanical). In summary, UL 2272 and IEC 60335-2-114 are **focused electrical safety standards**, whereas EN 17128 is a broader vehicle safety standard with limited electrical criteria.

- **Testing Rigor:** UL 2272 is known for rigorous battery and electrical tests designed to prevent fires and malfunctions. It subjects devices to **stress tests including overcharge, short-circuit, crush, impact, vibration, thermal cycling, and drop tests** to ensure the battery and electronics can withstand abuse. It also evaluates the enclosure's ability to contain fires and tests the charger/battery interaction. The 2024 revision of UL 2272 incorporated even more stringent tests, such as a **reverse polarity test** (ensuring a wrong charger or reversed connections won't cause hazards), and requirements for **tamper-resistant battery enclosures** so consumers cannot easily access cells. IEC 60335-2-114:2022 was developed with input from Australian regulators to match this rigor – it includes requirements for **temperature limits, overcharge protection, vibration and shock resistance, and water ingress protection** for the electrical system. For example, it tests that components do not overheat or shake loose under vibration, and that the device is safe even if ridden through water splashes. The standard ensures the charger and battery are compatible (likely by requiring that charging stops at the correct voltage and current). EN 17128's electrical testing is much less comprehensive: the CPSC noted that EN 17128's requirements for electrical systems "**are not as comprehensive as those in UL 2272**". EN 17128 focuses on mechanical performance and user protection features (like speed limiting, braking performance, lighting and warnings) more than on battery abuse tests. It does require basic electrical safety (no accessible live parts, proper wiring, etc.), but **lacks the dedicated fire/thermal runaway tests** that UL/IEC standards have. In practice, many European e-scooter manufacturers have voluntarily tested to UL 2272 or now IEC 60335-2-114 to ensure fire safety, even if EN 17128 doesn't mandate it.

- **System vs Component Coverage:** These e-scooter standards generally treat the **device as an integrated system**. UL 2272 covers the full electrical system in the scooter or hoverboard, including the battery pack (with an assumption that the battery pack itself meets UL 2271 or similar), the control electronics, and the charger coupling. IEC 60335-2-114, being a part of the IEC 60335 appliance safety series, also looks at the device holistically (battery + electronics together). Neither UL 2272 nor IEC 60335-2-114 is just a battery standard – they ensure the *whole product* doesn't catch fire or shock the user in normal and abusive scenarios. EN 17128 touches multiple subsystems: electrical, mechanical, software (e.g., requires certain safety-related control functions), but for battery testing it can rely on external standards. Notably, Australia/New Zealand's adoption (AS/NZS 60335.2.114:2023) and some regulatory schemes allow compliance by either testing the whole device to these system standards or by a combination (device + separate battery certification). This flexibility is for practical reasons, but the highest confidence comes from testing the integrated system.

- **Certification and Enforcement:** UL 2272, like other UL standards, is voluntary but has seen strong uptake in some regions due to safety concerns. In the U.S., the CPSC's December 2022 letter explicitly also called out UL 2272 (for e-mobility devices) as critical for reducing fire risks. Some cities/states are starting to require it for e-scooter rentals or sales. Internationally, **Singapore was an early mover – since July 2019, all motorized personal mobility devices there must be UL 2272 certified to be sold or used**. This effectively eliminated non-certified e-scooters in that market. In Australia, New South Wales has introduced **mandatory compliance** effective February 2025 for e-scooters, hoverboards, etc., requiring either UL 2272, the equivalent **AS/NZS 60335.2.114:2023**, or compliance with EN 17128 for sale in that state. Europe does not yet have a legal requirement that e-scooters meet EN 17128 or any particular standard (EU laws lag behind – e-scooters are not road-"type approved" EU vehicles in most countries, and they fall under the general product safety framework). However, if an incident occurs, an unsafe e-scooter could be deemed a dangerous product if it fails to meet state-of-the-art safety standards (for instance, a fire due to a battery that wouldn't happen if UL 2272 had been followed). **IEC 60335-2-114** being new, is voluntary until adopted; Australia is adopting it, and other countries may follow. The U.S. CPSC is moving toward making UL 2272 effectively mandatory for these devices by incorporating it (with some additions) into a federal rule. **Acceptance:** UL 2272 is highly regarded in North America and Asia (Singapore). EN 17128 is recognized in Europe as the consensus standard, but because it's not focused on fire, **some EU nations or companies might require more** (for example, a retailer might insist on IEC 60335-2-114 or UL certification for the e-scooters they carry, for liability reasons). The UK has no specific e-scooter standard requirement (since e-scooters are currently illegal on public roads except trials, standards have not been mandated beyond general safety), but any that are sold (for private use on private land) would be expected to at least meet basic EN or UL standards. **Australia** is leading in enforcement via electrical safety law – by declaring these devices as "electrical articles," NSW can stop sales of non-compliant units. Overall, UL 2272 and IEC 60335-2-114 are becoming the *gold standard* references for e-scooter electrical safety globally, even if enforcement is patchy outside of certain jurisdictions.

Scorecard – e-Scooter Electrical System Standards (Out of 100):

- **UL 2272 (USA/ANSI standard)** – *Rating: 95/100.* **Fire Prevention:** Very high – incorporates stringent tests to prevent battery fires and explosions (overcharge, crush, thermal runaway containment, etc.). The latest version addresses even corner cases (e.g. reverse polarity mishaps). **Verification:** Requires NRTL certification, meaning products truly meeting UL 2272 have been independently tested. **System Integration:** High – evaluates the complete device and ensures only compatible chargers and protected battery systems are used. **Enforcement:** Increasing – mandated in locales like NYC (for hoverboards), Singapore (nationally), and proposed by CPSC for all USA. Still voluntary in many markets, but momentum is toward broader adoption. **Consumer Safety:** Proven to drastically cut down the notorious fires seen with cheap hoverboards; a UL 2272-certified device offers much greater peace of mind. *What's missing:* UL 2272's new edition already includes many enhancements (tamper-resistant sealed batteries, temperature sensing to halt charging, etc.); to reach 100, one area to strengthen could be **better end-user guidance and labeling** – e.g. smart indicators when a battery is unsafe to use. Another improvement could be requiring a form of **authentication between charger and device** (to ensure truly only the correct charger is used), although this is partially addressed through the standard's electrical specs. Wider global enforcement is the main gap – the technical standard is nearly 100 in content.

- **EN 17128 (EU standard)** – *Rating: 70/100.* **Fire Prevention:** Moderate/Low – does not emphasize battery fire testing; it primarily requires the battery and charger comply generally with existing safety standards. For instance, it might reference UN38.3 transport tests or basic battery protections, but it lacks the dedicated abuse tests of UL/IEC (CPSC explicitly found it "falls short" on addressing all electrical hazards). **Verification:** If used for CE marking, usually self-declared; third-party test is optional. **System Integration:** Covers many aspects of the vehicle (mechanical stability, braking, lighting) giving a holistic picture of safety **except** for the detailed electrical interactions. Thus, integration of electrical components isn't stress-tested as rigorously. **Enforcement:** Indirect – not legally required EU-wide, but if there's an incident, compliance with EN 17128 would likely be examined. Some EU countries have guidelines, but enforcement varies. **Consumer Safety:** Helps ensure a minimum level of general safety (prevents obvious mechanical hazards or electrical shock), but doesn't eliminate fire risks from lithium batteries to the degree consumers might expect. *Missing:* To be top-notch, EN 17128 would need to integrate or reference **comprehensive battery system tests** (similar to UL 2272/IEC 60335-2-114) rather than focusing mainly on mechanical safety. More robust electrical requirements (thermal runaway testing, charger lock-out features, etc.) would fill the gap. Also, making certification mandatory (and more uniform across EU) would improve its effectiveness.

- **IEC 60335-2-114:2022 (International standard)** – *Rating: 90/100.* **Fire Prevention:** High – being modeled after known best practices (it includes overtemperature, overcharge, short-circuit tests, etc., and even environmental tests like water and vibration that contribute to fire safety by ensuring robustness). **Verification:** As an IEC standard, it relies on adoption – but if a product is certified by an IECEE CB scheme lab or similar, that provides assurance. Many labs (CSA, TÜV, etc.) can test to this standard already. **System Integration:** High – like UL 2272, it treats the e-transporter as a whole, requiring the entire assembly to be evaluated for safety. **Enforcement:** Emerging – not yet required globally, but countries like Australia are adopting it as a mandatory standard (AS/NZS 60335.2.114). If the EU or others adopt it in the future, enforcement will grow.

- **Consumer Safety:** Strong – a device compliant with this standard should be as safe electrically as one compliant with UL 2272, covering the major known causes of fires and malfunctions. *Missing:* Since it's new, **real-world track record** is shorter – ongoing review may identify minor gaps. One potential enhancement could be explicit provisions to prevent **user tampering or unsafe battery swaps** (the standard ensures safety under normal use, but if a consumer replaces the battery with a non-original one, a digital verification system – see later discussion – would be outside the scope). Overall, it's robust; the score reflects that it achieves technical parity with UL in most areas, losing points mainly due to the current lack of widespread enforcement (which is a factor in practical safety).

Lithium-Ion Battery Standards for LEVs (e-bike and e-Scooter Batteries)

Lithium-ion battery packs are at the core of e-bikes and e-scooters, and dedicated standards exist to ensure their safety. The key standards here are **UL 2271** (for LEV battery packs in the U.S.), **EN 50604-1:2016 + A1:2021** (the EU's lithium battery safety standard for light EV applications), and relevant **IEC standards** (chiefly IEC 62133-2:2017 for rechargeable lithium cells, and others like IEC 62619 for larger format batteries). These standards address the battery pack as a component, covering its design, construction, and ability to withstand abuse without causing fire or harm.

- **Scope:** UL 2271 ("Batteries for Use in Light Electric Vehicle Applications") covers rechargeable lithium-ion battery packs and modules intended for devices like e-bikes, e-scooters, wheelchairs, and other LEVs. It is a comprehensive standard focusing on the pack level (including cells, BMS, enclosure). EN 50604-1 is the European counterpart for "Secondary lithium batteries for light EV applications – General safety requirements and test methods." It was specifically developed to address e-bike and similar battery packs in the EU context. Its scope is very similar: it defines tests for packs up to certain voltage/classes to ensure safe operation. IEC 62133-2:2017 is an **international cell-level standard** for secondary lithium cells and small battery assemblies, widely used as a baseline for lithium battery safety in many products (it's referenced by transport regulations and was formerly used for e-bike batteries under EN 15194). However, IEC 62133 mainly covers single cells or small multicell batteries in portable appliances – it does not fully address larger multi-cell packs with complex BMS. IEC has a newer standard **IEC 62619** (2017 and updated 2022) which covers lithium batteries for industrial applications (e.g., forklifts, energy storage); this is closer in spirit to UL 2271 but aimed at bigger "industrial" batteries. Light EV batteries fall in a gray area; hence EN 50604-1 was created in absence of an exact IEC analog. In summary, **UL 2271 and EN 50604-1 have a dedicated focus on LEV battery packs**, whereas IEC's coverage is split between general small battery safety (62133) and larger battery systems (62619), with 62133 historically used for e-bike batteries but now being supplanted by more specific standards.

- **Testing Rigor:** Both UL 2271 and EN 50604-1 put battery packs through **stringent abuse tests** to ensure safety in foreseeable misuse or failure modes. UL 2271's test regime includes: overcharge and over-discharge protection verification, external short-circuit tests, crush and impact tests, shock and vibration tests, heating (thermal stability) tests, and temperature cycling. It checks that if cells go into thermal runaway, the pack mitigates propagation, and requires safety circuitry (BMS) to prevent over-current or over-voltage situations. EN 50604-1 similarly specifies

tests like external short circuit, overcharge, mechanical shock, drop, thermal exposure, and even fire exposure (to see if a burning cell is contained). One key difference: UL 2271 explicitly requires evaluating the **battery management system** functions (for example, if a pack is overheated or damaged, it should disconnect to prevent fire). The CPSC has noted that UL 2271 (2023 edition) could further improve by adding a **post-charge thermal cutoff test** (to ensure the BMS won't charge if cell temperature is too high, borrowing from UL 2272). EN 50604-1, as of the 2021 amendment, is considered robust – in fact, the EU determined that without EN 50604-1, the prior reliance on just IEC 62133 was insufficient for safety. IEC 62133 itself has a much more limited set of tests (it checks cell-level overcharge, short-circuit, and some environmental tests on cells/batteries, but does not simulate a thermal runaway chain reaction in a full pack, for example). **Overall, UL 2271 and EN 50604-1 are comparable in rigor**, covering a wide range of abuse conditions to prevent fires. UL 2271 is sometimes viewed as the stricter benchmark ("pinnacle of safety standards for batteries"), but that may be partly due to its required third-party certification. EN 50604-1's tests should achieve a similar safety level if followed, though it might allow slightly different criteria or have some differences in test specifics.

- **System vs Component Coverage:** These battery standards treat the **battery pack as a standalone component**. They ensure the battery's internal safety, which in turn benefits the system safety. UL 2271, for example, demands the pack have protective measures (voltage/current/temperature monitoring, cell balancing, etc.) so that even if the e-bike or e-scooter's main controller fails, the battery itself won't go into a hazardous state. However, neither UL 2271 nor EN 50604-1 dictates how the battery interfaces with the vehicle beyond generic terms – that is left to the system standards (UL 2849, UL 2272, etc.). The integration aspect comes in where, for example, UL 2849 will require that any battery used in a UL-certified e-bike must meet UL 2271. EN 15194 now effectively requires the battery to meet EN 50604-1 for the bike to comply. So, the **system-level enforcement of these battery standards** is how component safety is ensured. From a certification perspective, a battery can be tested and certified to UL 2271 on its own. Similarly, a battery maker can get an EN 50604-1 test report. IEC 62133 is often used at the cell manufacturing stage (cells get certified to IEC 62133, then those cells are assembled into a pack which is certified to UL 2271 or EN 50604). An interesting aspect is **user-replaceable vs built-in batteries**: CPSC's proposals highlight concerns about user-replaceable packs (sold separately) needing equal safety oversight. UL 2271 and EN 50604 apply to both kinds, but additional system measures (like ensuring only correct packs are used) fall under device standards.

- **Certification and Enforcement:** UL 2271 is typically enforced when a manufacturer seeks UL certification for their product or when regulations call for it. For instance, New York City's e-bike law implicitly enforces battery safety by requiring UL 2849 system certification (which in turn means the battery met UL 2271). The U.S. CPSC's proposed rule would make it mandatory that e-mobility batteries (including those sold separately or in conversion kits) comply with UL 2271 (with some enhancements). In the EU, EN 50604-1 is not yet harmonized (the Machinery Directive harmonization for the battery clause is pending), but from 2025, any e-bike claiming compliance with EN 15194 will need to have batteries tested to EN 50604-1. Thus, indirectly, it will be enforced via the CE marking process and market surveillance. The UK has issued **guidance that points to BS EN 50604-1** as the benchmark for e-bike batteries, meaning UK authorities expect compliance with it under the General Product Safety Regulations for a safe product. Australia's NSW regulation explicitly lists EN 50604-1 and UL 2271 (and IEC 62133) as acceptable standards for e-bike and e-scooter batteries sold in that state. That means in NSW, by Feb 2025, a battery must be proven to meet one of those standards to be sold. **IEC 62133**

historically was the go-to for international compliance (e.g., UN transport rules require testing akin to IEC 62133 for lithium batteries). It is still accepted in some regulations (NSW interestingly allows IEC 62133-2:2017 as an option for compliance, likely as a minimum baseline). However, reliance on IEC 62133 alone is decreasing for high-capacity packs because it's not considered sufficient for full battery pack safety. In terms of acceptance: **UL 2271 is highly regarded in North America** but not commonly used by European makers (they would use EN/IEC standards). **EN 50604-1 is becoming the standard in Europe** and likely will be adopted elsewhere (it could be transposed into an IEC standard eventually). **IEC 62133 is universally recognized** and often required for shipping and basic compliance, but on its own it's seen as inadequate for the complete battery pack safety for these vehicles.

Zipidi Scorecard – Li-ion Battery Pack Standards (Out of 100):

- **UL 2271 (Battery for LEV)** – *Rating: 92/100.* **Fire Prevention:** Excellent – subjects packs to harsh abuse to prevent fire/explosion (overcharge, crush, short tests). Packs meeting UL 2271 have protective designs and have demonstrated they can handle likely failure modes without catastrophe. **Verification:** Requires UL certification testing, which is stringent. **System Integration:** Good – ensures battery has all necessary safety circuits to integrate safely (and system standards reinforce using UL 2271 packs). **Enforcement:** Growing – voluntary but now referenced by laws (CPSC proposal, NYC via UL 2849 requirement, NSW law, etc.). **Consumer Safety:** High – a UL 2271 certified battery drastically lowers risk of thermal runaway in normal and foreseeable misuse. *Missing:* Minor improvements identified by regulators: e.g., adding **tamper-resistant seals** so users cannot easily open or rebuild the pack with subpar cells, and adding a **reverse polarity/incompatible charger test** directly in UL 2271 (currently being considered). Also, better **labeling/traceability** could be mandated (so consumers know if a replacement pack is certified or not). Once these are in place and compliance is mandatory, it would approach 100/100.

- **EN 50604-1 (Battery for light EV)** – *Rating: 88/100.* **Fire Prevention:** Very good – covers a comprehensive set of abuse scenarios (the EU wouldn't mandate it if it didn't significantly improve safety). It's on par with UL's technical scope in most respects (shock, thermal abuse, etc.). **Verification:** Typically tested by third-party labs for CE certification (while not strictly required by law, in practice many manufacturers will get an independent test report for liability/insurance). **System Integration:** Moderate – focuses on the battery itself; relies on the vehicle standard to ensure the battery is properly integrated. (For example, EN 50604-1 might not explicitly test using an incorrect charger – that would be addressed if the charger is CE marked separately. The new EN 15194+A1 links the system and battery more tightly.) **Enforcement:** Imminent in EU (through standard compliance for CE) and referenced in UK guidance; also accepted in places like Australia. **Consumer Safety:** High – when implemented, it should greatly reduce battery fires in e-bikes. *Missing:* Like UL, it could benefit from requirements on **battery enclosure integrity** (ensuring a robust casing and perhaps tamper-resistance). Also, explicit testing for **charger-battery communication or lockout** is not emphasized – pairing EN 50604-1 with a charger standard (EN 60335-2-29 for chargers) is assumed but doesn't guarantee a user won't mix up chargers. Lastly, because enforcement has been slow (it's not yet "harmonized" in EU law as of 2024), not all manufacturers have adopted it – accelerating full compliance and perhaps developing an **IEC equivalent** (so global manufacturers can test once for all markets) would help it reach 100.

- **IEC 62133-2 (Rechargeable cell/battery standard)** – *Rating: 70/100.* **Fire Prevention:** Basic – ensures individual cells or small battery packs can withstand certain stresses (overcharge to a point, short-circuit for a brief time, etc.) and have safety vents to avoid explosion. It does not, however, simulate a large multi-cell thermal runaway or a pack-level failure cascade. **Verification:** Often required for transport certification (UN38.3) and typically third-party tested. Many cells on the market are certified to IEC 62133. **System Integration:** Low – this standard doesn't address battery management systems or integration into devices; it's meant as a component test. **Enforcement:** Widespread as a *minimum* – essentially every lithium battery shipped internationally adheres to something like IEC 62133 for transport. But as a consumer product safety measure, regulators prefer more specific standards now. **Consumer Safety:** Sufficient to weed out the most unsafe cells, but not enough to guarantee a safe e-bike or e-scooter battery pack on its own. (An e-bike pack that only did IEC 62133 tests might still catch fire if not engineered with further protections.) *Missing:* Almost everything at the pack level – cell balancing, propagation resistance, robust enclosure, thermal sensing, etc., are outside IEC 62133's scope. To reach top safety, IEC 62133-based testing must be **augmented with pack-level standards**. (It's worth noting that IEC 62133 was never intended to be the sole standard for a complex device's battery – it's more for general use. The development of standards like EN 50604-1 underscores the need for those extra tests.)

The Case for Digital Verification and Product Passports

Across all categories (e-bikes, e-scooters, and their batteries), one recurring challenge is **compliance and traceability** – how to ensure that the product meeting the standard in a lab actually maintains that safety in the field and over its lifecycle. This is where **digital verification and "product passports"** can greatly improve safety oversight.

A *product passport* is a digital record associated with a product that can store information like its certified standards, manufacturing details, and safety-related data. For e-mobility devices and batteries, digital verification could help in several ways:

- **Authentication of Certification:** A battery or e-bike could have a digital fingerprint that, when scanned, shows its model and whether it was certified to UL 2271, UL 2849, EN 50604-1, etc., and by which lab. This would prevent counterfeit claims and allow regulators, retailers, or consumers to instantly verify if a product is compliant. Given reports that some manufacturers only claim "UL conformance" without actual certification, a digital registry would expose that difference. For example, NYC requires the lab's certification mark on the product – a digital record could back this up and be harder to fake than a printed logo.

- **Tracking Battery Lifecycle and Replacement:** e-bike and e-scooter batteries often get replaced or upgraded. A digital passport could record the battery's serial number and safety standard. If a third-party or aftermarket pack (potentially not certified) is installed, a savvy system could flag this (the e-bike's onboard electronics could even read a chip on the battery). This way, users are warned if they are using an uncertified or incompatible battery. It also aids **traceability** in case of recalls – manufacturers can notify owners of affected serial numbers through the digital contact info.

- **Ensuring Proper Charger Use:** A digital verification system can pair batteries and chargers. For instance, a charger could query a chip in the battery to confirm it's the correct type before charging – if not, the charger refuses to start. This kind of digital handshake could enforce the

compatibility that standards like UL 2272/2849 are trying to assure via mechanical/electrical means. It would reduce cases of fires from people using the wrong charger on a device. Product passports could also list the approved charger models for a given battery.

- **Regulatory and Consumer Access to Safety Information:** With a standardised digital passport, authorities in different regions (USA, EU, UK, Australia) could easily access the safety credentials of a product. For example, at customs or during market surveillance, scanning the code on an e-scooter might show it's certified to UL 2272 by SGS in 2024, and also perhaps compliant with AS/NZS 60335.2.114. Similarly, a consumer considering a second-hand e-bike can scan and see if it originally was UL certified or not, improving transparency in the resale market.

- **Facilitating Recalls and Updates:** If a standard is updated (say, new firmware is needed in a BMS to comply with revised UL requirements), the digital system could inform users to get a service update. Or if a batch of batteries is identified as defective, the passport system helps target the recall to those units. This kind of responsiveness is much harder with just paper labels.

By implementing digital passports for e-bike and e-scooter batteries, manufacturers and regulators can achieve a higher level of compliance assurance and safety monitoring than standards alone can provide.

In summary, today's UL, EN, and IEC standards provide a solid foundation for safety – each with strengths and some gaps – but combining them with **digital verification mechanisms** would greatly enhance enforcement and consumer confidence. Such a system would ensure that the intent of the standards (fire prevention, proper system integration, and ultimate consumer safety) is actually realized in every product on the market, and maintained throughout its life. This is an important step toward achieving the elusive 100/100 safety rating: not just writing excellent standards, but making sure every e-bike, e-scooter, and battery in use truly meets them.

Appendix B - Summary of NSW Requirements for Certification of e-Micromobility Products

What's changed?

E-bikes, e-scooters, e-skateboards, self-balancing scooters and the lithium-ion batteries used to power these devices are now ‘declared electrical articles’ under the Gas and Electricity (Consumer Safety) Act 2017.

This means that these products need to comply with the prescribed mandatory safety standards before they can be sold in NSW.

From 1 February 2025, lithium-ion e-micromobility devices, such as e-bikes and e-scooters, sold in NSW must comply with the prescribed safety standards. These requirements have been introduced to ensure that only safe and compliant products are available in the market, reducing the risk of fires.

From 23 May 2025, the product safety standards for lithium-ion e-micromobility devices have been updated and are available on the NSW Government Gazette website. This Order now limits the clauses of the prescribed Standards to electrical safety and prescribes the mandatory safety requirements that products must meet to be sold in NSW.

The NSW Government has also introduced a new Information Standard for lithium-ion e-micromobility devices sold in NSW. From 19 February 2025, suppliers must provide clear and accurate safety information at the point of supply. This includes details about safe use, charging, storage, fire prevention, and disposal of devices and their batteries.

Until 1 August 2025, NSW Fair Trading will conduct educational inspections to ensure businesses understand their legal obligations. On 1 August 2025, enforcement will come into effect and the following penalties may apply:

- fines of up to $825,000 for breach of the Product Safety Standards
- fines of up to $5,500 for each breach of the Information Standard.

Key dates

- August 2024- Announcement and gazettal of the new standards.
- February 2025 - New product criteria and information requirements.
- August 2025 - Enforcement of mandatory testing and certification.
- February 2026 - Enforcement of mandatory labelling.

Which Standards do my products need to comply with?

The products must comply with any one of the **Standards** listed for the product category below.

e-bikes

For e-bikes with a maximum continuous rated output not exceeding 500 watts

- AS 15194:2016 - Cycles - Electrically power assisted cycles - EPAC Bicycles (also known as pedelecs): Limited to Clauses 4.2 (all - except requirements of Electro Magnetic Compatibility), Clause 5 (all - except requirements of AS/NZS 1927) and Clause 6 (all - except requirements of AS/NZS 1927), or
- EN 15194:2017+A1:2023 - Cycles - Electrically power assisted cycles - EPAC Bicycles: Limited to Clauses 4.2 (all - except requirements of Electro Magnetic Compatibility), Clause 5 and Clause 6. References to EN 60335-2-29 (battery chargers) have been replaced by AS/NZS 60335.2.29, or
- UL 2849:2022 - Electrical systems for eBikes

For e-bikes with a maximum continuous rated output exceeding 500 watts

- UL 2849:2022 - Electrical systems for eBikes

e-bike batteries

- EN 50604-1:2016+A1:2021 - Secondary lithium batteries for light EV (electric vehicle) applications, or
- IEC 62133-2:2017 - Secondary cells and batteries containing alkaline or other non-acid electrolytes- Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications- Part 2: Lithium systems, or
- UL 2271:2018 - Batteries for use in light electric vehicle (LEV) applications (until 1 February 2027) or UL 2271:2023

Note: References to “EN 50604-1” in clause 4.2 of EN 15194:2017 + A1:2023 or AS 15194:2016 are replaced by “EN 50604-1:2016 +A1:2021 or IEC 62133-2:2017 or UL 2271”.

The specifications for AS 15194:2016 and EN 15194:2017 +A1:2023, compliance to the relevant clauses for batteries and battery chargers may be shown by submission of existing test reports and does not require additional retesting.

Compliance to clauses 5 and 6 of EN 15194:2017 +A1:2023 or AS 15194:2016 may be verified by inspection of photographs and does not require further assessment.

e-scooters, e-skateboards and hoverboards

- AS/NZS 60335.2.114:2023 - Household and similar electrical appliances- Safety. Part 2.114: Particular requirements for personal e-transporters, or
- EN 17128:2020 - Light motorised vehicles for the transportation of persons and goods and related facilities and not subject to type-approval for on-road use- Personal light electric vehicles (PLEC)- Requirements and test methods, or
- UL 2272:2016 - Electrical systems for personal e-mobility devices (until 1 February 2027) or UL 2272:2014

e-scooters, e-skateboards and hoverboards batteries

- AS/NZS 60335.2.114:2023 - Household and similar electrical appliances- Safety. Part 2.114: Particular requirements for personal e-transporters, or
- UL 2271:2018 - Batteries for use in light electric vehicle (LEV) applications (until 1 February 2027) or UL 2271:2023.

Electrical safety requirements

E-micromobility power supplies and chargers require **certification and approval** under the Gas and Electricity (Consumer Safety) Act.

- Under the Gas and Electricity (Consumer Safety) Act 2017, section 8, e-micromobility batteries and chargers must meet the AS/NZS 61558 series or AS/NZS 60335.2.29, as appropriate.
- Under the Gas and Electricity (Consumer Safety) Regulation 2018, section 6, e-micromobility batteries and chargers must carry the appropriate **approval mark** according to the requirements of the certificate.

Full details of the NSW requirements are available here

https://www.nsw.gov.au/housing-and-construction/safety-home/electrical-safety/lithium-ion-battery-safety/new-standards-for-lithium-ion-batteries-e-micromobility-devices