

# New Mobility

Alternative transport for better outcomes

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## Executive Summary

Freedom of movement is enshrined in Article 13 of the Universal Declaration of Human Rights. The expression of this right relies on there being accessible and safe transport available for people to use. Furthermore, transport underpins the fundamental needs of society to move goods and people around.

Transport is not performing as well as it could. In many ways the freedom of movement for people and goods that transport supports is now more damaging than it needs to be to the environment, to the economy, and to people.

TRL's vision for new mobility is a transport system that provides better choice and access for everyone, serving as an enabler for better outcomes across these areas. In practice new mobility refers to a range of existing and emerging transport modes, services and technologies that have potential to provide a compelling alternative to the motor vehicle. At its core, new mobility is about rebalancing the movement of both people and goods away from single occupancy, inefficient, fossil-fuel powered vehicles.

But achieving these goals is not straightforward; there is no 'silver bullet' that can entirely replace the need for internal combustion engine vehicles and solve all of our societal challenges. Instead the answer lies in understanding, developing and implementing the right mix of new mobility solutions.

TRL has a deep technical understanding of New Mobility solutions and their potential to drive meaningful societal benefits. Our internationally recognised team of scientists, researchers and consultants is supporting the New Mobility revolution across a range of areas:

1. Understanding the needs and motivations of users to ensure new mobility is suitable for everyone and successfully drives the right changes in behaviour.
2. Driving evidence-based development of clear, appropriate and flexible policy, standards and regulation to enable new mobility.
3. Understanding how to adapt, optimise and future proof our built environment so that it supports changing mobility needs and patterns
4. Leading robust trials of new mobility modes, services, technologies and infrastructure and evaluating the impacts.



## The Transport Legacy

For the last century the crux of how people travel around, on land at least, has remained broadly unchanged. At a basic level, the options available to us have consisted of walking, cycling, using mass public transport in the form of buses, trams and trains, taking taxis, or using private motor vehicles. Even though significant advances in the technologies that power and enhance these modes have been made, the range of modes available to us has not changed, and the car has been the dominant mode in most instances.

This legacy has shaped our perspectives of transport, our behaviours, and our built environment. Our houses and apartments are largely built with consideration for car parking. Our towns, villages and cities are built around a network of roads for cars to use. And our roads are designed and built for car drivers. A thought-provoking graphic by the Swedish illustrator Karl Jilg highlights the perversity of the now car-centric world we live in.

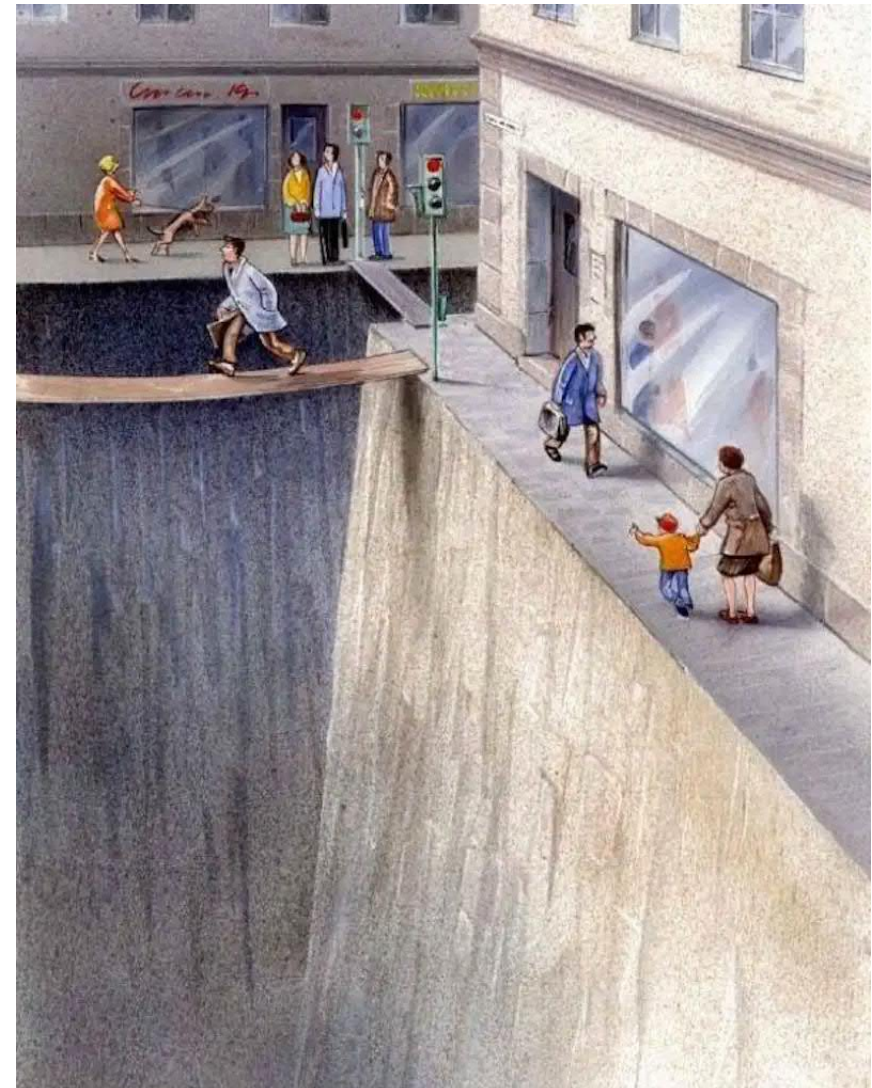


Figure 1: Illustration by Karl Jilg, commissioned by the Swedish Road Administration

## Drivers for change

Today, this model of moving people and goods from A to B is being challenged. Underlying this challenge are several important drivers and 'forcing functions' in growing recognition of the harms directly caused by motorised transport and the 'status quo':

- Since 2016, nations around the world have declared climate emergencies in recognition of the substantial threats posed by global warming and climate change. Transport has been and remains a key contributor of greenhouse gas emissions.
- Those emissions also affect the air we breathe. Pollution from the transport sector, particularly in our busiest cities, contributes to poor air quality which leads to 4.2 million premature deaths per year worldwide.
- Whilst fatalities in reported road accidents have fallen over the last 30 years, more recently the decline has plateaued, and 1,752 people still needlessly lost their lives in 2019 as a result of a road traffic collision (RTC) in the UK. Globally, RTCs caused 1.35 million deaths per year.
- At some times and in some locations, using motor vehicles to travel from A to B can be very inefficient. Delays from traffic congestion are estimated to cost the UK economy around £7 billion per year.
- Insufficient physical activity is a leading risk factor for premature death. Here motor vehicles create a vicious circle; with the car the default choice for most journeys, the appeal of active modes reduces as people don't feel safe or comfortable cycling and walking around large volumes of motorised traffic. The system therefore presents barriers to active travel, and greater motivations for driving, which presents even more barriers to active travel, and so on.
- Lastly, in a world where the car is the dominant mode of accessing our homes, jobs, education, healthcare, food, leisure, and other services, this leads to social exclusion of those who do not have access to their own car. This impacts quality of life.

**“Taken together this paints a rather negative picture; this is deliberate, not to detract from the significant and important progress that has been made in recent years around these issues, but to highlight with salience the need for systemic and substantial change going forward.”**

**“We must build and improve on the legacy of previous generations, to ensure a prosperous future for the next.”**

## The Vision for New Mobility

Our vision for New Mobility is a transport system that provides better choice and access for everyone. Of course, the devil is the detail; it is not simply about providing a larger number of mobility options for everyone, but the right mix of mobility options that enables us to achieve the outcomes we need to address the range of issues outlined above.

This does not mean there is no place at all for cars in the New Mobility mix. For most people, particularly in the near term, there will always be a proportion of journeys for which a car will be the quickest, most convenient, and most logical option, door-to-door. A two-pronged attack is needed therefore:

1. We must shift the default position away from private car journeys and onto more sustainable, safe, healthy and accessible modes.
2. We must reduce the impact of car use for those remaining journeys for which a viable alternative is not available, for example by shifting to zero-emission vehicles and driving continuous improvements in road safety.

Alongside these aims we should also remember that transport is a derived demand, borne out of the need to travel to places to access the products, services and experiences needed in our daily lives. The new mobility mix must therefore be considered in light of other concurrent societal and environmental changes, such as the (re)design of our living environments to bring essential services closer to where they are needed so more trips can be walked, and improvements in connectivity and digital services enabling more work, shopping, etc to be done virtually and removing the need for some journeys to be taken in the first place.

### New mobility that enables...

Net zero  
carbon emissions

Clean  
air

Zero  
road deaths

A socially  
inclusive society

No wasted  
time

Improved  
physical &  
mental health

Figure 2: The vision for New Mobility

## What does New Mobility look like in practice?

In line with this vision, New Mobility encompasses the new, emerging and alternative means of moving people and goods, including active travel, new technologies, business models and on-demand services.

It is important to acknowledge that this list is not finalised; innovation continues and other technologies and services (the 'TBCs') not currently on the table will emerge. At TRL we take a technology-agnostic approach; we apply our knowledge and skills to help the public and private sectors develop, test, implement and evaluate the full range of solutions. Our interests lie in producing the right mix of New Mobility solutions (as per our vision), not in any one particular approach.



Figure 3: New Mobility landscape





## TRL's Strategic Themes

At present the next generation of mobility is largely being driven by developments in 'CASE' technologies (Connected, Automated, Shared, Electrified). Many of the New Mobility modes and services are especially dependent on advances in connectivity and data and in vehicle automation. Consequently the new mobility theme overlaps strongly with two of TRL's other Strategic Themes: Digitisation of Transport, and Automation in Transport. Taken together, our Strategic Themes encapsulate the areas in which we are strategically investing, producing disruptive research and delivering innovation, these are:

### Environment & Decarbonisation

Transport solutions that protect the natural environment. The primary challenge is the decarbonisation of transport.

### Transport Safety

Safe systems incorporating safe roads, safe speeds, safe vehicles, safe road users

### Transport for Sustainable Development

The role of transport in driving sustainable development, with a focus on low to middle income economies.

### Automation in Transport

What automation will enable, and how it will be applied to transform the transport domain.

### Digitisation of Transport

Data and connectivity enabling new journey capabilities; this also includes digital roads and developing efficiencies for lifecycle asset management, including road design, construction, condition monitoring and maintenance.

### New Mobility

New ways of moving people & goods, including active travel, and new business models and on-demand services to promote inclusivity and ease of use.

## The Policy Landscape

The need for systemic change, the trends in technological developments, and the opportunities that these present, have been recognised by governments around the world. In the UK, the Government's Industrial Strategy<sup>1</sup> sets out four target areas where the country is aiming for global leadership; coined the 'Grand Challenges', these are 'AI and Data Economy', 'Clean Growth', 'Ageing Society' and the 'Future of Mobility'.

The Future of Transport programme<sup>2</sup>, part of this Industrial Strategy, is being jointly delivered by the Department for Transport (DfT), Office for Zero Emission Vehicles (OZEV) and the Centre for Connected and Autonomous Vehicles (CCAV). In recognition of the rapid developments in the new technologies expected to emerge over the next decade, the Future of Transport programme "aims to shape transport innovation and make the UK a world leader in transport movement". At the time of writing, this includes three key policy initiatives:

1. The Future of Transport: Urban Strategy
2. The Future of Transport: Regulatory Review
3. The Future of Transport: Rural Strategy – call for evidence

<sup>1</sup><https://www.gov.uk/government/publications/industrial-strategy-building-a-britain-fit-for-the-future>

<sup>2</sup><https://www.gov.uk/government/collections/future-of-transport-programme>



## The Future of Transport: Urban Strategy

The Future of Transport: Urban Strategy<sup>3</sup> sets out nine principles for facilitating innovation in urban mobility (Figure 4); at their core these principles set out that the New Mobility mix must be safe, inclusive, active, clean, efficient, integrated and connected.

### TRL's response

TRL is trialling various individual New Mobility solutions (e-scooters for example) and is well placed to ensure that validation and verification is undertaken for entire New Mobility systems in urban settings, within the [Smart Mobility Living Lab](#) in London.

1. New mobility modes and services must be safe and secure.
2. New mobility must be available to all.
3. Active travel must be first choice short urban journeys.
4. Mass transit is fundamental to an efficient transport system.
5. New mobility must lead the transition to zero emissions.
6. New mobility must reduce congestion through more efficient use of road space, sharing rides, maximising occupancy and consolidating freight.
7. The marketplace for mobility must be open to stimulate innovation.
8. New mobility must integrate with the wider transport system.
9. Data from new mobility modes and services must be shared where appropriate to improve operations and consumer choice.

Figure 4: New Mobility Principles (paraphrased from DfT Future of Transport: Urban Strategy)

<sup>3</sup><https://www.gov.uk/government/publications/future-of-mobility-urban-strategy>

## The Future of Transport Regulatory Review

The Future of Transport Regulatory Review aims to assess, review and update, where necessary, the regulatory framework governing the mobility sector to allow for innovation in the sector while also ensuring that New Mobility is safe, clean, and accessible. Regulations are being reviewed across several areas including micromobility, MaaS, data sharing, zero emission vehicles, automated vehicles, drones and 'future flight', maritime and legislation for bus, taxi, and private hire vehicles.

### TRL's response

Again, TRL is at the centre of this work and has been for three quarters of a century in various parts of transport. Although historically it has been a relatively slow process, TRL knows that regulation plays a central role in ensuring that the best benefits of technology developments are realised, delivering improvements for the people using transport systems. It is also a much faster process than it used to be, meaning that the opportunities it creates can be embraced within shorter term business planning.

**TRL has been closely involved in the development of vehicle regulations in Europe in the 21st century and will have a central role to play in regulations relating to New Mobility too.**

## Future of Transport: Rural Strategy

The government has just taken evidence to inform the development of their Future of Transport: Rural Strategy<sup>4</sup>. The innovations in New Mobility will not only bring about opportunities for those living and working in urban areas, but also hold considerable potential to address the needs and challenges of those in rural communities. In particular, the challenges around car dependency and social exclusion are heightened in some rural areas where public transport services and other alternative mobility options are less common. In designing and testing the right mix of New Mobility solutions, we must therefore ensure this divide is closed.

### TRL's response

TRL's response to the consultation noted that solutions in rural areas, more than anywhere, will rely on connectivity to deliver demand-matched supply in real-time (ideally ahead of time). To enable rural areas to participate in the benefits of New Mobility more fully, research trials should take place in rural areas first to accelerate the delivery of such services (including 'last mile', which in rural settings is often 'last-much-more-than-a-mile') as enablers of economic and social 'levelling up'.

<sup>4</sup><https://www.gov.uk/government/consultations/future-of-transport-rural-strategy-call-for-evidence/future-of-transport-rural-strategy-call-for-evidence>





## Cycling and Walking Strategy and 'Gear Change' policy

The benefits of active travel are wide ranging and clearly evidenced, and the government's ambition to make walking and cycling the first choice for as many journeys as possible is further reflected in the Cycling and Walking Strategy (CWIS)<sup>5</sup> and more recently, the 'Gear Change' policy paper published in 2020<sup>6</sup>. Here the government sets out the vision for cycling and walking in England and the associated actions required by government. It is focused on four themes: better streets for cycling and people; cycling and walking at the heart of decision-making; empowering and encouraging local authorities and; enabling people to cycle and protecting them when they do. As part of the announcement, the government has established Active Travel England; a new commissioning body and inspectorate that will take responsibility for inspecting and auditing highway authorities on how well they are providing for pedestrians and cyclists.

### TRL's response

We want to see a transport system which enables active travel to be the first-choice mode for as many journeys as possible. This means that active travel must be designed into the new mobility mix if we are to realise the benefits it will bring to carbon reduction, air quality and the physical and mental wellbeing of people. This includes prioritising active travel in the design and maintenance of infrastructure, as well as harnessing the power of digital technologies like traffic flow control systems (such as [TRL's Urban Traffic Control system powered by SCOOT®](#)) to prioritise active modes and ensure different modes can mix safely.

<sup>5</sup><https://www.gov.uk/government/publications/cycling-and-walking-investment-strategy>

<sup>6</sup><https://www.gov.uk/government/publications/cycling-and-walking-plan-for-england>

## Research Priorities

In summary, transport is changing, driven by a need to address several key negative social, public health, and environmental outcomes caused by the transport system that has been in place for the last century. While the end goals are clear, the specific solution is yet to be defined. The theme of 'New Mobility' encompasses a range of possible solutions and opportunities, which together have the potential to provide better choice and access for everyone.

There is an urgent need to address the harms caused by fossil-fuel powered motorised transport. There are some rapid technological advances happening in New Mobility solutions, and accompanying government policy and initiatives are helping to drive change in the transport sector. We must recognise the pivotal moment facing the industry and wider society and we must be creative in forming our future. Against this backdrop TRL believes there are four major research areas that require urgent focus:

1. We must understand and cater for the needs and motivations of users to ensure new mobility meets the needs of everyone and successfully drives behaviour change.
2. We must develop clear, appropriate, flexible and evidence-based policy, standards and regulation to enable new mobility.
3. We must adapt, optimise and future proof our built environment.
4. We must trial, monitor and evaluate new mobility modes, services, technologies and infrastructure to understand the type and scale of impacts and manage risks.

**“We must recognise the pivotal moment facing the industry and wider society and we must be creative in forming our future”**

## Understanding the varied needs and motivations of users

Transport users are fundamental to this transition. Without clear understanding and consideration of their needs and motivations, future developments in new mobility technologies and services will fail. We must draw on the wealth of evidence from the behavioural sciences to inform behaviour change programmes and system design choices to provide what people need.

This requires in-depth research into consumer adoption and use of new mobility technologies and services. It requires an in-depth understanding of the new mobility market and how that aligns with different consumer segments. And it requires feasibility studies and early market research to test and refine new business models.

### Our capabilities:

- Research and trials of consumer adoption and use of new technologies
- Human factors, ergonomics and workload assessments
- Statistical analysis of primary and secondary transport datasets
- Consumer segmentation
- Design and implementation of behaviour change programmes to promote modal shift towards active travel and other sustainable modes
- Feasibility studies and early market research to test new business models

### Key questions to be addressed:

- Who will use the new mobility service, why will they use it and what existing mode(s) will it replace?
- How much will people be willing to pay for the service? What price point is required to enable mass market adoption?
- What features are essential and what is 'nice-to-have'? How do system requirements vary for different types of consumer? How do we ensure new mobility fits the needs and motivations of everyone, and not only the young and wealthy Innovators?
- What will the impacts of new mobility services be for non-users – particularly the most vulnerable in society?
- How will the public respond during initial roll-out of new mobility services? What will the main risks be?
- What will be the main barriers to adoption and how do we overcome them?
- How can we develop viable and sustainable business models to meet user need? How will multiple stakeholders come together to provide integrated services and a seamless customer experience?



Case Study

## World's first trials of electric vehicles to understand mainstream consumer needs and motivations

Consumers, Vehicles and Energy Integration (CVEI) project

Energy Technologies Institute (ETI), 2015–2019

In 2019 we concluded an innovative and ambitious project led by TRL and delivered by a cross-industry consortium for the Energy Technologies Institute (ETI).

A key objective was to understand how mainstream consumers perceive and respond to EVs – addressing the limitations of previous research with the Innovators who have already made the decision to adopt.

We designed and delivered the world's first trials of fully electric and plug-in-hybrid electric – to give mainstream consumers real-world experience of using EVs in their daily lives. Our approach was informed by a segmentation of the private consumer market to understand and characterise the nuances of vehicle purchasing behaviour. The market is not homogeneous and there is no one-size-fits-all solution – by applying our behavioural and attitudinal expertise we were able to understand the range of barriers and motivators impacting future adoption of EVs.

## We must develop clear, appropriate, flexible and evidence-based policy, standards and regulation to enable new mobility

As set out in the Future of Transport Regulatory Review, the UK's regulatory framework has a long legacy spanning back to the 1800s and there is an urgent need to review and reconsider whether this model is still appropriate as we enter the next phase of mobility. In line with the Urban Mobility Principles, the new mobility mix must be safe, inclusive, active, clean, efficient, integrated and connected. An evidence-based approach to development of policy, standards and regulation is essential to ensure these goals are met.

### Our capabilities:

- Policy and market reviews, evidence-based development process
- Risk assessment, analysis, mitigation and management to inform the development of standards and regulations that put safety first
- Applying behavioural insights to development of policy and incentives
- Co-creation, deployment, monitoring and evaluation of innovative policy incentives and interventions (e.g. mobility credits schemes and road pricing)
- Vehicle safety performance testing and certification
- Collision investigation and incident forensics

### Key questions to be addressed:

- What level of regulation is needed to ensure quality and safety without stifling the market?
- To what extent are existing frameworks appropriate? Are new regulations and standards needed or can existing ones be adapted, and if so how?
- What standards, testing and accreditation programmes will be required around vehicles, technologies, services and data to ensure a safe system that is fit-for-purpose?
- What supporting policies will be needed to incentivise industry and consumers to change?
- To what extent can 'softer' nudges be more effective than 'hard' regulations?

Case Study

## Helping the European Commission with design of micromobility regulation

Study on market development and related road safety risks for L-category vehicles and new personal mobility devices.

European Commission, 2020–2021

TRL was commissioned by the European Commission to investigate the current state of the market for personal mobility devices (such as e-scooters) which are not currently covered by existing type-approval regulations. The work provided:

- An inventory of the various types of personal mobility devices available on the market
- A detailed analysis of the market and the influence of the existing legislations at EU and national level
- Collection and evaluation of available data and information on accidents involving personal mobility devices
- Assessment of the current use and the safety aspects related to the road circulation of personal mobility devices not covered by EU type-approval
- Recommendations with regard to minimum safety technical requirements they would have to fulfil and the traffic rules, i.e. use and behaviour rules, that they could be subject to.

## New service

# Micromobility vehicle performance testing

TRL has a long legacy in road safety research, vehicle testing and accreditation. Reflective of the changing mobility landscape, TRL has recently launched a new service for testing and providing assurance for powered micromobility solutions. The new breed of products, such as e-scooters, unicycles, hover boards and other powered personal transport modes, are intended for use on public roads but (with the exception of current shared e-scooter trials) it is not legal to ride them anywhere except private land.

We implement a rigorous and repeatable vehicle performance test procedure to provide powered micromobility OEMs and Operators with a detailed report on the product's key performance and safety features. An assessment of product geofencing functionality is also an option.

- Emergency brake testing assesses stopping distance and vehicle response under different conditions; is the rider able to maintain control throughout a sudden braking event and bring the vehicle to a controlled stop?
- Vehicle stability is tested when traversing different surfaces and when users attempt manoeuvres when they are not in full control (e.g. when making hand signals to turn). Can the rider stay "on board" and in control at all times?
- Geofencing tests account for varied weather conditions and urban environments.

As well as the core standardised service, we can also tailor the approach to meet specific client needs, for example to test specific features or environments, or provide comparisons across multiple products, to inform approaches for new mobility trials, policy and regulation.



## We must adapt, optimise and future proof our built environment

As the number and type of new mobility modes and services increase, our physical built environment must also adapt. The impacts on infrastructure will be broad, from reviewing and modifying walking and cycling infrastructure to ensure it is fit-for-purpose for other active and semi-active modes (like micromobility), to assessing how best to repurpose urban spaces that were once reserved for high volumes of fossil-fuelled vehicles (like fuel station forecourts and car parks). In all cases it will be necessary to understand local context, transport patterns, user needs and the feasibility and range of technological solutions.

### Our capabilities:

- StreetAudit: In-depth audits of the built environment to optimise design for specific groups, including pedestrians, cyclists, and freight
- UK Centre of Excellence for International Road Assessment Programme (iRAP) – helping to ensure infrastructure schemes are safe by design
- Off-street and on-street infrastructure trials
- Materials testing, pavement testing and surveying
- Intelligent Transport Systems technology evaluation and Horizon Scanning
- Junction design, evaluation and optimisation; suite of software solutions

### Key questions to be addressed:

- Is our infrastructure fit-for-purpose for new mobility or do we need to adapt it? If so, how?
- Is cycling infrastructure suitable for electric-powered micromobility vehicles?
- What accompanying changes to road layouts are needed to discourage car use?
- When are infrastructure changes needed and how do we ensure that upcoming changes are future-proofed as far as possible?
- What are the key risks that need to be managed?



## Case Study

# Testing innovative cycling infrastructure to increase cycling safety

## Cycle Facility Trials

Transport for London, 2012–2018

We were commissioned by Transport for London to test a series of innovative cycle facilities designed to improve cyclist safety. The project included live trials which looked at in-vehicle detection systems and their reaction to the presence of a moving cyclist, as well as examination of cyclist and driving behavioural reactions to various cycle facilities including:

- Segregated cycle lanes
- Low-level cycle signals
- Two-stage right turns
- Alternative junction layouts
- Orbital 'Dutch-style' cycle lanes on roundabouts

The trials enabled testing of novel cycling infrastructure with 6,250 research participants – the largest trials of their kind ever conducted at TRL. This generated a rich dataset for TFL to inform their cycling infrastructure roll-out strategy in London. Following the off-street testing programme, we undertook follow-up work to monitor and evaluate the impact of the infrastructure once implemented in London.

## Service and software package

# Street Auditing

TRL has an expanding range of software dedicated to assessing and reporting on the streetscape with the ultimate aim of improving design and creating safer, accessible, sustainable and superior streets.

Three auditing techniques have been developed by TRL to assess the quality of street environments:

- PERS – Pedestrian environments
- CERS – Cycling environments
- FERS – Freight environments

Individually or collectively, auditing these environments allow policy makers and stakeholders to highlight and understand any problems and set realistic priorities in each of these challenging environments.

To facilitate the storage, manipulation and display of information collected on site, TRL has developed 'StreetAudit', a dynamic software application to assess the quality of any pedestrian, cyclist and freight environment. Its systematic framework allows pedestrian, cyclist and freight provision to be assessed, reviewed and audited and boasts a number of useful features:

- Easy to use graphical user interface
- Search functions for the fast identification of poorly scoring environmental features
- Built-in GIS mapping capabilities
- Graphing functions
- Export functions to other GIS tools
- Automated production of quick win recommendations
- Storage of photographs collected on site
- High quality metafile image exports for the preparation of reports.



## We must trial, monitor and evaluate new mobility modes, services, technologies and infrastructure

Piloting and trialling novel mobility technologies, infrastructure and services is critical for understanding the type and scale of impacts and managing potential risks ahead of wider roll-out. Phased approaches are optimal for minimising commercial, technical and safety risks; this can range from simulation (e.g. using driving simulators, digital twins or virtual reality) to off-street testing in controlled conditions, to full on-road trials.

### Our capabilities:

- Driver simulation using TRL's high-fidelity suite of 'DigiSim' driving simulators
- Virtual reality and 'digital twin' research
- Safety cases for on-road trials
- Monitoring and evaluation of real-world trials
- Broad range of qualitative and quantitative data collection techniques
- Vehicle and street instrumentation including telematics, sensors and camera-based systems
- Development, testing and validation through the Smart Mobility Living Lab: London – a real-world test-bed for new mobility solutions

### Key questions to be addressed:

- How do we scale up the intervention for real world implementation?
- What is the impact of the intervention on the key outcome measures?
- Did it work as intended? Were there any unintended consequences?
- Was the investment good value for money?
- How can we continuously improve?





### Case Study

## Understanding the impact of a Mobility Credits scrappage scheme

Monitoring and Evaluation of a Mobility Credits scheme  
Transport for West Midlands, 2020–ongoing.

Transport for West Midlands is delivering a trial in which participants are given Mobility Credits in exchange for scrapping their old polluting cars – part of the West Midlands Future Transport Zone. These can then be used for alternative modes of transport, such as public transport and car sharing. TRL has been commissioned to monitor and evaluate the impact that the trial has on travel behaviour and how it is received by participants.

We are gathering, analysing and interpreting the behavioural response to the Mobility Credits scheme in order to determine whether the trial has been successful. To do this we are employing a before-and-after approach utilising mixed methods and both primary and secondary data collection. Our monitoring and evaluation activities are seeking to capture the impact of the Mobility Credits scheme on aspects such as travel behaviour and mode choice, single occupancy vehicle use, emissions, access to opportunities for low income groups and overall customer satisfaction with and access to travel.

Additionally, our approach will provide insights into users' preferences towards specific characteristics of the Mobility Credits scheme design. This is fundamental for learning lessons from the trial and allowing adjustments to be made to the functionality, application and effectiveness of Mobility Credits in future.

## Smart Mobility Living Lab (SMLL): London

### A real world testbed for new mobility solutions

The [Smart Mobility Living Lab: London](#) (SMLL) is a flagship Connected and Automated Mobility (CAM) Testbed designed to provide international leadership in the development of CAM technologies for complex urban mobility environments. SMLL is the world's most advanced urban testbed of its kind with the sole purpose of accelerating the creation of mobility solutions that are clean, efficient, safe, reliable and convenient for everyone.

Over the last two years TRL, has led a consortium of industry and public sector partners, supported by UK Government and Innovate UK, in the design and development of the Living Lab in the heart of London, Europe's megacity.

SMLL launched in 2020, having completed 24 km of varied complex real-world environments that provide the most extensive and advanced testbed for urban mobility solutions anywhere in the world. SMLL enables rapid access to complex testing environments building on the UK's supportive approach to safe on-road trials of new connected and automated mobility technologies.





Working closely with partners, SMLL has created an extensive facility, incorporating a network of public roads, over 200 fixed monitoring sites, V2X and plug & play infrastructure. In addition, SMLL provides dedicated 5G cells, ground truth services, a digital twin built from the Lab's BIM modelling of the testbed's network, virtual validation support, dedicated fibre network access, two control rooms and supporting facilities office, workshops and secure vehicle storage.

The success of the SMLL programme has been built upon TRL's leading role and participation within a wide range of connected and autonomous vehicle technology and policy development projects for the public and private sector. From 2015 TRL led the GATEway consortium in the delivery of the UK's first public AV trials in Greenwich, London. The programme trialled automated last mile passenger pods, automated grocery deliveries, automated valet parking and simulator trials examining driver interactions with AVs. Since 2015 we have participated in multiple connected and automated mobility projects, working as innovators with Automotive OEMs and Tier 1s across Europe, including Five AI's Streetwise programme.

## About TRL

### **Our mission: Creating clean, easy, efficient transport that is safe and reliable for everyone**

TRL is a team of expert scientists, engineers and specialists working together with our clients and partners to create the future of transport.

- We publish software that helps the world's largest cities, and many smaller towns too, reduce pollution, carbon footprint and congestion with advanced traffic management, better road design and good asset management
- We conduct leading edge research into infrastructure, vehicles and human behaviours which enables safer, cleaner, more efficient transport
- We deliver detailed incident investigation, structural survey and other high value field services to help clients to improve the service they give their customers
- We work with universities and other partners to invest in basic and applied research that will underpin future needs
- We have built, with partners from government and industry, the Smart Mobility Living Lab: the world's first physical and virtual testbed in a global megacity (London) that lets companies test new mobility products and services safely on live public roads
- Established in 1933 as the UK government's Road Research Laboratory, the renamed TRL was privatised in 1996 and today has more than 1000 clients in many countries. Our headquarters are in Crowthorne House, near Bracknell, and we have offices in Birmingham, Edinburgh, London, Germany and India

### **Transport Research Foundation (TRF)**

**The TRL group of companies is owned by the Transport Research Foundation: a non-profit distributing company that enables our experts to give independent advice without influence from shareholders or finance companies.**



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