

Good road safety practices in the following areas:

Pedestrians and road workers on inter-urban roads

**Older people, people with reduced mobility
and PMD users in urban areas.**

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EXECUTIVE SUMMARY

This document analyses five very specific cases of exposure to risk and potential collisions.

- Inter-urban areas, high-capacity roadways (collisions affecting pedestrians and workers employed on such roadways)
- Urban areas (users with reduced mobility, older people and users of Personal mobility devices)

About **Pedestrians on inter-urban roads**, the report focuses on drivers travelling on a road who are at some point forced to leave their vehicle for some reason, whether because of a crash or a breakdown.

Several factors contribute to this vulnerability, drivers are often taken by surprise when they encounter a pedestrian on the road as this is not an everyday occurrence and, in the worst cases, it can result in sudden evasive manoeuvres or even collisions.

When vehicles stop on the carriageway, and the driver or passengers then alight, this may entail negative consequences above all if it takes place in dangerous areas, such as on bends, at junctions or in the middle of the carriageway.

Meanwhile, pedestrian protection is essentially confined to making oneself seen by drivers, a task which on occasion, such as low levels of light, reflection or adverse meteorological phenomena, becomes more challenging.

This is, then, a situation in which pedestrian safety depends on two factors: first of all, minimising their exposure to the risk by remaining on the carriageway for as short a time as possible, and making sure they are seen; and furthermore, once they have been detected by the driver, trusting that the latter will have the capacity and sufficient time to avoid a collision. In both cases, technology provides important support and is even able to prevent collisions.

Secondly, about **Road workers**, an analysis is conducted of the profile of workers positioned on the carriageway performing any type of work, whether maintenance or other construction tasks, or those working in roles connected with driver assistance (tow trucks or emergency services) or traffic control (law enforcement agencies).

The road as a workplace encompasses a large number of professionals, ranging from operatives responsible for maintenance and repair to tow truck and roadside assistance drivers, including all the workers in charge of traffic safety or emergencies.

The maintenance and repair work undertaken across the various road networks in Europe is performed by professionals who face significant exposure to the risk of collisions.

There is a constant risk of collisions, which varies depending on the various scenarios and actors involved. As such, every situation must be analysed thoroughly to determine the measures needed to keep all workers safe when undertaking actions on roads of any kind.

The work performed by such staff is essential to guarantee road safety; repair, maintenance and signage improvement work makes a significant contribution to improving safety for all users.

Many factors are involved in collisions of this type, such as inappropriate speed, distraction, poor visibility and failure to obey signs. Meanwhile, the need to perform such work at times when there is no impact on traffic, such as night-time working, tends to heighten the situation of risk.

In **Urban areas, older people** are a continuously expanding group in the European Union, with the percentage of those aged over 65 years increasing from 16% in 2002 to 21% in 2022.¹

This growth is giving rise to a demographic transformation in the region, where many European countries are implementing policies and programmes to support older people, promote active and healthy ageing and boost social and economic participation for this section of the population, for all of which it is necessary to foster and ensure safe mobility.

According to the latest European Commission thematic report on seniors, in Europe over 1 in 4 people killed in road collisions and 1 in 2 pedestrians or cyclists killed in road collisions are aged 65 or over.

The report stresses that, as drivers, older people pose a greater risk to themselves than to others.

Lack of mobility can result in social isolation for this community and the implementation of public policies must take into consideration the fact that older people face safety challenges when they use public transport or drive due to issues of mobility, sight, hearing and shorter reaction times.

In terms of urban accessibility, many European cities continue to pose architectural barriers and deficiencies in public transport that make it difficult for older people to move around.

About **people with reduced mobility**, it is an ethical and social imperative to guarantee the mobility of this group, thereby promoting inclusion and equal opportunity within our societies.

People with disabilities or reduced mobility face additional challenges in their daily lives and, as occurs with the senior community, access to appropriate mobility plays a key role in their quality of life and participation in society. Accessible mobility has a positive impact on emotional and mental well-being for both groups of people.

It is important to recognise that accessible mobility is much more than the presence of appropriate infrastructure, such as ramps, lifts and wide adapted pavements. Policies and services must be in place to ensure equity and dignity for everybody, without regard to their physical abilities.

Europe is witnessing significant progress in terms of accessibility for people with reduced mobility. However, despite the regulations and laws requiring certain accessibility standards in public buildings and spaces, many European cities still have significant obstacles for people with reduced mobility.

Public transport is also a major challenge. Although some transportation systems are adapted for people with disabilities, not all cities offer comprehensive solutions to facilitate equal access. This places limits on the mobility and independence of people who rely on wheelchairs or have difficulty moving.

Finally, this report focuses on the study of a group that has seen significant growth in recent years, the group of drivers of **personal mobility devices in urban areas**, which have become increasingly popular due to their practicality, low cost and mobility options.

¹ European Union's 2023 Demography Report <https://ec.europa.eu/eurostat/web/interactive-publications/demography-2023>

This situation has led to a number of changes in urban mobility, even in social habits, offering an alternative to traditional modes of transport, and helping to improving connectivity and last-mile transportation, allowing people to reach their destination faster and with greater flexibility.

On the other hand, however, challenges are emerging, relating primarily to safety, because the coexistence of pedestrians, cyclists, cars and personal light electric vehicles can give rise to situations of conflict and even danger. The lack of clear rules and regulations is a highly topical area of debate and many cities are implementing specific policies and strategies to efficiently integrate personal light electric vehicles in road infrastructure.

If there is one mobility-related element which has seen (and continues to see) exponential growth, then it is Personal mobility devices (PMD), and specifically e-scooters.

Both shared bicycles and scooters have emerged as a sustainable and efficient alternative to traditional transport. These systems have gained popularity in numerous European cities. Such services allow users to rent a PMD via a mobile app, to be used to get around the city.

However, their rapid growth raises a series of challenges, some of which require urgent attention, above all as regards safety and regulations.

1. INTRODUCTION

Safe mobility on roads and streets is a public health, economic and social issue that transcends borders and cultures. New forms of mobility and population changes, together with the challenge of ensuring universal accessibility, require a major effort to understand and address each of the specific problems associated with mobility.

Mobility for everyone helps to improve people's quality of life and has a significant impact on the economy, the environment and public health, but it is also the case that managing and organising it effectively poses a genuine challenge for the government of every country.

This document presents a thorough analysis of a series of challenges directly affecting road safety and mobility from a comprehensive perspective, ranging from the state of research into each of the issues to the implementation of projects and practices of interest.

2. OBJECTIVES

The main objective of the present document is to provide an in-depth study of the current state of activity centred on five specific mobility-related situations, with the aim of fostering the development of effective planning and prevention strategies.

The importance, the growth and at the same time the specificity of these groups led the road safety representatives of the different countries to propose this report.

To achieve this objective, the document sets out in detail each of the five subjects under analysis to enable executive leaders and decision makers to progress towards solutions that will reduce traffic collisions, minimise injuries and ultimately save lives.

2.1. OBJECTIVES FOR AREAS ANALYSED

The objectives for each of the subjects are as follows:

- **Improving pedestrian safety on high-capacity roads:** High-capacity roads are usually faster, increasing the level of risk for people who have to walk along them, either to get from A to B or because of a vehicle breakdown.
- **Keeping workers safe on high-capacity roads:** It is necessary to guarantee the safety of people working on high-capacity roads. This includes construction workers, road maintenance and repair operatives, emergency personnel and other professionals who face significant risks while working.
- **Facilitating safe mobility for people whose mobility is limited due to disabilities:** Fostering equality and inclusion in mobility is a key objective. For people with disabilities, mobility can be a significant challenge which needs to be addressed through accessible infrastructure or adapted transportation systems, among other measures.
- **Ensuring that older people can participate safely in mobility today:** Older people often face difficulties getting from A to B, either because of health problems or barriers in the built environment. They require action to improve safety in their everyday mobility.
- **Implementing policies and measures for effectively mainstreaming micromobility in the current system:** Micromobility, including bicycle sharing, electric scooters and other light modes of transport, has become an important part of contemporary urban mobility. It is essential to establish policies and regulations to ensure user safety, appropriate management of these vehicles and their contribution to sustainable mobility in cities.

3. METHODOLOGY

The documentary research has been carried out taking into account the objectives set for this document. Once collected, it was subjected to an in-depth analysis.

The process of analysis was structured systematically, beginning with a careful review of each topic in its corresponding context.

The information that was gathered together was organised clearly and coherently into a number of sections based on subject matter. Each of these sections begins with a concise summary of the core ideas, the fundamental objectives and the key aspects found.

Each section has attempted to create a structured framework that organises the information from the literature review, technical reports, best practice documents and EU-funded research studies².

Lastly, it was decided to include a series of fact sheets elaborating on the practices of interest implemented in each of the subjects.

In particular, the process followed in each of the main subsections of each section was as follows:

Data extraction and Analysis

- ✓ Systematically extract the relevant data from each of the topics discussed.
- ✓ Synthesising and presenting the data

Experimental research

This section lists research studies that have been partially or fully funded by the European Union, as well as other studies found in the scientific literature worldwide.

- ✓ EU-Funded Research Studies:
 - ✓ Identify relevant EU-funded research studies through project websites.
 - ✓ Review methodologies, objectives, and outcomes of each study.
 - ✓ Extract key findings and innovations from the EU-funded research studies.
- ✓ Literature Review:
 - ✓ Conduct a thorough literature review to identify relevant studies and articles in related to the chosen topic.
 - ✓ Organize literature into categories
 - ✓ Summarize key findings in the existing literature.

Best Practice and measures implemented:

- ✓ Identify and gather best practice documents related to the chosen topic.
- ✓ Evaluate the relevance of each document.
- ✓ Incorporation of the practices that have been sent by each of the countries concerned.

Technical reports:

² Sources used are shown in the following section 3.1. Documentary analysis

- ✓ Identify reports relevant to the research topic and the objectives of each report

Conclusions:

- ✓ Practical conclusions based on the synthesis of findings.
- ✓ Suggest areas for future research and exploration.

After the presentation of the first document on 20th September 2023, a period was opened in which countries concerned submitted observations and incorporated the information considered relevant.

3.1. DOCUMENTARY ANALYSIS

The literature and document review was performed by means of a comprehensive search on various websites, using keywords referring to the five subjects under discussion.

It was undertaken primarily in the European Union and with a time horizon of a maximum of five years, although in certain cases some references that fell beyond this limit were included if the document was of particular interest.

The search for reports, practices of interest and studies funded by the European Union was carried out primarily on the following websites:

- **CORDIS** <https://cordis.europa.eu/projects>
- **FERSI** <https://fersi.org/>
- **ELTIS** <https://www.eltis.org/>
- **ASECAP** <https://www.asecap.com/>
- **ITF** <https://www.itf-oecd.org/>
- **CDR** <https://www.cedr.eu/>
- **POLIS** <https://www.polisnetwork.eu/>
- **ETSC** <https://etsc.eu/>
- **EUROPEAN ROAD SAFETY CHARTER** <https://road-safety-charter.ec.europa.eu/>
- **COMISIÓN EUROPEA (PUBLICACIONES)**
https://commission.europa.eu/publications_en

The main scientific publications and search engines consulted were the following:

- **EUROPEAN JOURNAL OF PSYCHOLOGICAL ASSESSMENT** (EDITOR: HOGREFE)
- **TRAFFIC INJURY PREVENTION – ONLINE** (EDITOR: TAYLOR & FRANCIS)
- **INJURY PREVENTION-ON LINE** (EDITOR: BMJ PUBLISHING GROUP)
- **JOURNAL OF STUDIES ON ALCOHOL AND DRUGS – ONLINE** (EDITOR: ALCOHOL RESEARCH DOCUMENTATION)
- **TRANSPORTATION –NE-ONLINE-ENHANCED ACCESS** (EDITOR: SPRINGER SCIENCE BUS MEDIA BV)
- **ACCIDENT ANALYSIS & PREVENTION – ONLINE** (EDITOR: ELSEVIER SCIENCE DIRECT)
- **TRANSPORTATION RESEARCH - PART A - POLICY & PRACTICE** (EDITOR: ELSEVIER SCIENCE DIRECT)
- **TRANSPORTATION RESEARCH - PART F - PSYCHOLOGY AND BEHAVIOUR** (EDITOR: ELSEVIER SCIENCE DIRECT)

- **JOURNAL OF SAFETY RESEARCH** (EDITOR: ELSEVIER SCIENCE DIRECT)
- **SAFETY SCIENCE** (EDITOR: ELSEVIER SCIENCE DIRECT)

In addition, general searches were performed, making it possible to locate material on other sites not listed above.

During the process of elaboration of this document, contributions from representatives of different European countries have been incorporated.

4. AREAS ANALYSED

This document sets out and analyses specific aspects relating to road safety both in cities and on the roads connecting them.

The study covers five specific cases of exposure to risk and collisions.

- In inter-urban roads, the report focuses on people who exit their vehicles on roads and personnel whose working area is the road (road, assistance or emergency workers and traffic officers).
- In streets, the groups studied are seniors, people with reduced mobility and their vehicles, and users of personal light electric vehicles (PLEVs).

This analysis sets out the documentation found regarding research projects financed with European funds, experiences of practices of interest reported through the European Road Safety Charter and other European organisations, and reports and papers from mobility and road safety related organisations, primarily in Europe, but also from around the world.

Each chapter has been supplemented with an analysis of the latest specific research studies on each of the subjects. These studies were conducted primarily in Europe, although given the specific nature of the subjects studied, it was considered to be of interest in some cases to gather studies undertaken beyond the borders of Europe which can offer insight of considerable interest.

4.1. INTER-URBAN ROADS

Motorways, dual carriageways and conventional roads are designed to allow large flows of vehicles moving at high speeds, especially in the first two cases. The most frequent incidents on this type of road are roadway departures and collisions between vehicles.

Vehicles dominate on this roads, so use by other types of users, such as pedestrians, poses a significant risk to the latter. This group's vulnerability increases in these areas because of two factors: both their lack of protection and the fact that their presence can take drivers by surprise.

This report focuses on two very specific profiles:

- The first study profile represents drivers travelling on a road who have to abandon their vehicle at some point for whatever reason, whether it is due to a collision or a breakdown.
- The second study profile represents personnel doing work of any kind on the road, either maintenance or other construction activities, or people undertaking duties relating to roadside assistance (tow trucks or emergency equipment) or traffic control law enforcement agencies and emergency personnel.

4.1.1. *PEDESTRIANS ON ROADS*

Pedestrians, everyday users in cities, are less common on high-capacity roads, where their status as vulnerable users are exacerbated.

Several factors contribute to this vulnerability. Drivers are often taken by surprise when they encounter a pedestrian on the road as this is not an everyday occurrence and, in the worst cases, it can result in sudden evasive manoeuvres or even collisions.

Vehicles stopping on the carriageway, with the driver or passengers subsequently exiting, can have negative consequences, especially if this occurs in dangerous or low-visibility areas such as bends, junctions and in the middle of the road.

In addition, protection for pedestrians fundamentally consists of merely taking as few risks as possible and being visible to drivers, which can be complicated on occasions, such as in the event of poor light, reflections or adverse weather conditions.

As such, the safety of pedestrians depends on two factors in this situation, namely minimising exposure to risk by staying on the road for the shortest possible time and being visible; and, after they have been seen by a driver, relying on the latter to have the ability and sufficient reaction time to avoid a collision.

In both cases, technology can provide considerable support and may even be able to prevent collisions.

4.1.1.1. DATA ANALYSIS

The [latest thematic report on pedestrians](#) coordinated by the European Commission, provides a general indication of the main causes of collisions involving pedestrians, most notably two key factors, distraction and speed. These two aspects are exacerbated on roads, leading to a significant increase in the risk of collision and the severity of injuries.

Road Safety Thematic Report – Pedestrians

Pedestrians comprise around 20% of all road deaths in the EU, a proportion that has remained stable over the last decade.

Most pedestrian injuries occur in urban areas and indeed pedestrians account for 38% of all road deaths in such areas. Cars account for over 70% of vehicles hitting pedestrians.



[Link](#)

In 2022, [126 pedestrians died on interurban roads in Spain](#), over half of them on motorways or dual carriageways. Only eight of those killed were wearing reflective clothing.

Pedestrian collision figures - Spain 2021

According to the report “Las principales cifras de siniestralidad de los peatones – España 2021” (Main Figures on Pedestrian Accidents – Spain 2021) by the DGT, the three main pedestrian collision scenarios on inter-urban roads are:

1st Motorway: pedestrian without a reflective waistcoat hit by a car

2º Conventional road: pedestrian crossing without a reflective waistcoat.

3rd Motorway: pedestrian repairing vehicle or during roadside assistance, wearing a reflective waistcoat. Main cause in this case: driver distraction.




[Link](#)


4.1.1.2. EXPERIMENTAL RESEARCH

The search yielded initiatives with a specific focus on preventing this risk, ranging from systems to improve the visibility of pedestrians and vehicles stopped on the road to others based on systems to assist drivers and alert them to the presence of pedestrians.

The projects financed with European funds studying the safety situation of pedestrians represent a major step forward in the prevention of road collisions. Projects focusing on early detection of pedestrians, in both good visibility and low visibility conditions ([Detection of pedestrians and cyclist outside a line of sight](#)) offer solutions to help drivers make decisions.

DEEPSIGHT - DETECTION OF PEDESTRIANS AND CYCLIST OUTSIDE A LINE OF SIGHT	
DeepSight project develop an innovative detection system that will employ a low-frequency radar with a resolution designed to detect cyclists, pedestrians and objects outside a line of sight. It will guarantee road safety and effective assisting drivers in their proper decisions.	
Program: HORIZON.1.1	
	
Coordinated by: Tel Aviv University	Country: Israel
Start date: June 2022	End date: November 2023
Link	

The [Safety in Smart Vehicle - Pedestrian Interaction](#) project aims to improve the detection of pedestrians on roads by applying algorithms that are able to predict the intentions of pedestrians on a road, even in low visibility conditions.

SSVPI - SAFETY IN SMART VEHICLE - PEDESTRIAN INTERACTION	
This project aims to develop multi-source and multi-modal algorithms which can predict intentions of pedestrians under challenging lighting conditions (using both visible (RGB) and thermal imaging), using cues from both pedestrian movements and their environmental and social context. The project aims to enhance the safety level of pedestrians in the context of Road Safety.	
Program: H2020-EU.1.3.	
	
Coordinated by: Imperial College of Science Technology and Medicine	Country: United Kingdom
Start date: April 2022	End date: March 2024
Link	

Literature reviews of the studies published on this subject make it possible to draw some conclusions that are directly applicable to the reduction of on-road collisions involving pedestrians:

- Use of different models to discriminate all possible variables to characterise pedestrian collisions to the greatest extent possible, to be able to develop effective countermeasures in each scenario (Riccardi, Mauriello, Scarano, & Montella, 2023)
- Studies focusing on drivers' perception (Frémont, Phan, & Thouvenin, 2020) and attention (Galy, Motak, & Berthelon, 2023) during unexpected events such as the presence of a pedestrian, which offer significant conclusions to gain a better understanding of the process occurring before a possible incident.
- Studies outlining causality patterns and typical scenarios to conduct a detailed study of each of them (Yue, Abdel-Aty, Wu, Zheng, & Yuan, 2020).
- Analyses of the scenarios where collisions occur and forecasts for the implementation of various policies are also the subject of studies (Chalabi, Roberts, Edwards, & Dowie, 2008) of value for decision makers in this field.
- Specific cases, which nonetheless are also of importance in this sphere, such as the case of on-road suicides (Radun, Radun, Sutela, & Tolvanen, 2023). There is a significant prevalence of this form of suicide in some countries.

List of research studies found, conducted in Europe:

Title & Authors	Objective:	Year	Country	Download
Deliberate fatal crashes involving a motor vehicle and a cyclist or pedestrian. (Radun, Radun, Sutela, & Tolvanen, 2023)	Analysis of deliberate crashes that resulted in the deaths of cyclists and pedestrians. Possible reasons for this relatively high number of road suicides in Finland and discuss the legal implications..	2023	Finland	link
Analysis of contributory factors of fatal pedestrian crashes by mixed logit model and association rules. (Riccardi, Mauriello, Scarano, & Montella, 2023)	This study is aimed at analysing the roadway, environmental, vehicle, driver and pedestrian-related factors that are associated with fatal pedestrian crashes in Italy and providing insights for the development of effective countermeasures. This study used an econometric model, the mixed logit model, and a machine learning algorithm, the association rules, to analyse 101,032 pedestrian crashes that occurred in Italy.	2023	Italy	link
Avoiding manoeuvre when faced with an unexpected versus likely pedestrian. (Galy, Motak, & Berthelon, 2023)	The purpose of this study was to identify the strategies adopted by drivers when confronted with an unexpected event, pedestrian crossing, and to test the influence of having (or not) a collision with the pedestrian when faced to others pedestrian.	2023	France	link

Title & Authors	Objective:	Year	Country	Download
Adaptive visual assistance system for enhancing the driver awareness of pedestrians. (Frémont, Phan, & Thouvenin, 2020)	Propose a new visual assistance system that can enhance drivers' perception by dynamically directing attention to pedestrians to avoid collisions using Augmented Reality cues.	2020	France	link
Epidemiology of pedestrian–MCVs by road type in Cluj, Romania. (Hammann, Peek-Asa, & Rus, 2015)	Pedestrian–motor vehicle (PMD) crash rates in Romania are among the highest in all of Europe. The purpose of this study was to examine the characteristics of pedestrian–MVCs in Cluj County, Romania, on the two major types of roadways: national and local.	2015	Romania	link
Traffic and the risk of vehicle-related pedestrian injury: a decision analytic support tool. (Chalabi, Roberts, Edwards, & Dowie, 2008)	Pedestrian injuries are a leading cause of death and disability. Transport policy decisions have a major impact on the risk of pedestrian injury, but the effects cannot usually be quantified in controlled studies. However, mathematical modelling can help to establish the injury consequences of transport policy decisions.	2008	United Kingdom	link

List of research studies found, conducted outside Europe:

Title & Authors	Objective	Year	Country	Download
In-depth approach for identifying crash causation patterns and its implications for pedestrian crash prevention. (Yue, Abdel-Aty, Wu, Zheng, & Yuan, 2020)	The purpose of the DREAM (Driving Reliability and Error Analysis Method) is to systematically classify the contributing factors behind a crash through in-depth investigation (Aust, 2010, Sandin, 2009, Wallén Warner et al., 2008). The DREAM uses a classification scheme that consists of phenotypes, genotypes, and directional links between the phenotypes and genotypes and between different genotypes.	2020	United States	link

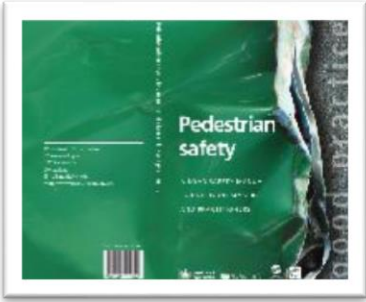
4.1.1.3. BEST PRACTICES AND MEASURES IMPLEMENTED

The search yielded initiatives with a specific focus on preventing this risk, ranging from systems to improve the visibility of pedestrians and vehicles stopped on the road to others based on developing systems to assist drivers and alert them to the presence of pedestrians.

Annex 2 contains detailed information on each of the practices listed.

Measure/action	Coordination	Objective	Source	Country	Download
DGT 3.0 connected vehicle platform and V16 DGT device	DGT	V-16 is an orange flashing light device that replaces the triangles as a method of signalling a vehicle stopped on the road. It must be placed on the highest possible part of the vehicle when it is immobilised on the road, this device communicates its geolocation with the DGT 3.0 platform, in order to be able to inform other drivers.	European Road Safety Charter	Spain	link
Pedestrian safety – common responsibility	Local public authority - Malopolska	The Małopolska Voivodship Police Headquarters in Cracow undertook a detailed assessment of the illumination of and road markings at pedestrian crossings for the whole region. After identifying a large number of deficiencies, especially related to illumination, 322 illuminated pedestrian crossings were installed on all types of roads Improvement of the safety of pedestrians in whole region of Malopolska on pedestrian crossings: 2016: 18 fatalities, 485 crashes 2019: 12 fatalities and 328 crashes 2022: 8 fatalities and 234 crashes	European Road Safety Charter	Poland	link
Luminescent road markings	Local public authority - Vasallo	Experimental application of luminescent marking, using paint containing reflective pigments	European Road Safety Charter	Belgium	link
SAFE-UP Project	APPLUS+ - IDIADA	Training platform designed to raise awareness among users.	ELTIS	Spain	link
Geolocation of accidents	DGT	Graphic tool to enable visualisation of the geolocation of the accidents recorded and their corresponding data.	DGT	Spain	link
Adaptation of roads in areas near pedestrian crossings	DGT	To make mobility activities safer for vulnerable users, particularly in the case of the elderly and users of personal mobility vehicles, it is vital that the layout of streets around pedestrian crossings be adapted, especially when there are no traffic lights, so that these areas enable such users to coexist with the presence of motor vehicles.	DGT	Spain	link
SHADAR Project	CEDR	This project evaluated the current state-of-the-art and improvement of detection of stopped vehicles, the road user behaviour when confronted with a stopped vehicle in different positions, weather conditions and traffic situations and the process of discovery, warning, verification, firm response action, and communication.	CEDR	Austria	link

4.1.1.4. TECHNICAL REPORTS

Title	Coordinated by	Objective	Year	Download	
Pedestrian safety: a road safety manual for decision-makers and practitioners	WHO	This manual equips the reader with necessary information on: the magnitude of pedestrian death and injury; key risk factors; how to assess the pedestrian safety situation in a country or area and prepare an action plan; and how to select, design, implement and evaluate effective interventions. The manual stresses the importance of a comprehensive, holistic approach that includes enforcement, engineering and education.	2013	link	

4.1.1.5. CONCLUSIONS

To improve road safety for this group, the following factors could be taken into consideration if appropriate:

- Focus on the behaviour of both pedestrians and drivers outside urban areas to prevent on-road vehicle-pedestrian collisions.
- Anticipation of the areas of the road where pedestrians are most likely to be present and adjustment of the road infrastructure accordingly.
- More comprehensive training of and better information to drivers on how to react in the event of a breakdown or an emergency on these types of roads.
- Reduce pedestrians' exposure to risk by pedestrians spending as little time as possible on the road, being visible and walking in appropriate areas, where possible and relevant.
- Improvement of safety on stretches of major roads located in urban areas (section of road through villages), is a task that could be addressed by the relevant authorities in each case.
- Fitting pedestrian detection systems in vehicles to prevent collisions involving this group of people.
- Characterise on-road vehicle-pedestrian collisions in full detail in statistics to develop effective strategies in each scenario.

4.1.2. *ROAD WORKERS*

The road as a workplace encompasses a large number of professionals, ranging from operatives responsible for maintenance and repair to tow truck and roadside assistance drivers, including all the workers in charge of traffic safety or emergencies.

The maintenance and repair work undertaken across the various road networks in Europe is performed by professionals who face significant exposure to the risk of crashes.

There is a constant risk of collisions, which varies depending on the various scenarios and actors involved. As such, every situation must be analysed thoroughly to determine the measures needed to keep all workers safe when undertaking actions on roads of any kind.

The work performed by such staff is essential to guarantee road safety. Repair, maintenance and signage improvement work make a significant contribution to improving safety for all users.

Many factors are involved in collisions of this type, such as inappropriate speed, distraction, poor visibility and failure to obey signs. In addition, it is necessary to undertake this work at times when traffic is not impacted, such as night work which generally exacerbates risk situations.

4.1.2.1. DATA ANALYSIS

Although sources of traffic and work collision statistics do not provide consistent, standardised data, various technical research projects and academic studies have resulted in significant conclusions.

It has been observed that the most serious collisions at roadworks areas are vehicle-pedestrian collisions, and most of these collisions feature vehicles that are not involved in the work and usually occur within the work site. Moreover, speed has been identified as the most influential factor in collisions of this type.

In Spain on the State Road Network in the period 2007-2013, according to a report by the [National Institute for Safety and Health at Work](#), 34 occupational incidents were identified at road maintenance and repair work sites, of which 21 were fatal and 13 were serious or very serious.

Working group:

Prevention in infrastructure maintenance and operation works.

The aim of this document is to highlight the critical points relating to the health and safety of workers, associated with the risks covered by this Working group, in the conservation and maintenance of roads and non-metropolitan railway infrastructures, and to include the recommendations for improvement proposed by the Working group in relation to these critical points, so that the entities concerned can assess their adoption within the scope of their activities and competences.





[Link](#)

In 2021, according to the National Register of Traffic Accident Victims in Spain, there were [158 collisions associated with maintenance and repair work on roads](#), of which 17 involved operatives who were working or walking near the carriageway as pedestrians. Of these 17 victims, 2 lost their lives when they were hit by vehicles that were speeding in the roadworks area or whose drivers were distracted. The other 141 collisions on sections of roadworks involved maintenance and repair operatives inside their vehicles.


4.1.2.2. EXPERIMENTAL RESEARCH

The main challenges addressed by the European studies include developing effective perimeter protection for work areas ([SAFELANE, An all-encompassing, intelligent safety and asset management system for highway maintenance](#)), applying artificial intelligence (AI) to create a virtual safety zone and alert workers in the event of danger ([ZIMASS Smart mobile awareness and safety system for workzone invasion](#)) and using collaborative robotics and modularisation to keep personnel safe in work areas ([INFRAROB Maintaining integrity, performance and safety of the road infrastructure through autonomous robotized solutions and modularization](#))

SAFELANE - AN ALL-ENCOMPASSING, INTELLIGENT SAFETY AND ASSET MANAGEMENT SYSTEM FOR HIGHWAY MAINTENANCE	
<p>The Safelane consortium have successfully developed a wireless perimeter protection system that detects an impact to a temporary barrier.</p> <p>The system includes a Smart re-chargeable lantern battery with integrated wireless impact sensor; a Smart alarm base station capable of receiving alerts from individual impact sensors, to warn the workforce; and a device management system enabling road maintenance contractors to effectively manage temporary work sites via a web based graphical user interface.</p>	
<p>Coordinated by: Highway resource solutions LTD</p>	<p>Country: United Kingdom</p>
<p>Start date: November 2012</p>	<p>End date: October 2014</p>
<p>Link</p>	
<p>Program: FP7</p> 	

ZIMASS - SMART MOBILE AWARENES AND SAFETY SYSTEM FOR WORKZONE INVASION	
<p>The EU-funded ZIMASS project is developing a smart portable and reliable awareness and safety system for work zone invasion.</p> <p>It uses computer vision and artificial intelligence (AI) to create a virtual security zone and alerts workers in case of danger. The system's response time is immediate, at less than one second.</p>	
<p>Coordinated by: Semotic Innovation. S.L.</p>	<p>Country: Spain</p>
<p>Start date: August 2019</p>	<p>End date: November 2019</p>
<p>Link</p>	
<p>Program: H2020-EU.2.3.</p> 	

INFRAROB - MAINTAINING INTEGRITY, PERFORMANCE AND SAFETY OF THE ROAD INFRASTRUCTURE THROUGH AUTONOMOUS ROBOTIZED SOLUTIONS AND MODULARIZATION

<p>By focussing on the road bed and, particularly, on roads paved with asphalt (the most widely applied type of pavement in Europe, accounting for 90% of all paved roads and highways), the project will develop autonomous robotized systems/machinery for (re)paving, repairing cracks/potholes in the road surface, and line marking. In addition, it will develop (iv) robotized safety systems for workers and road users. It will then develop (v) integrated one-piece precast construction elements for the roadside drainage serving a major degree of modularization in road design and construction/upgrade.</p>		<p>Program: H2020-EU.3.4.</p>
		
<p>Coordinated by: Universidad de Vigo</p>	<p>Country: Spain</p>	
<p>Start date: September 2021</p>	<p>End date: February 2025</p>	
<p>Link</p>		

Literature reviews of the studies published on this subject make it possible to draw some conclusions that are directly applicable to the reduction of on-road collisions involving workers:

- An analysis of parameters such as speed and drivers’ visual fixation in roadworks areas revealed that behaviours were unsafe (signs marking roadworks areas are not perceived properly by drivers) (Vignali, y otros, 2019)
- An analysis of signs indicated that panels with graphics are more effective at attracting drivers’ attention (Huang, Bai, & Asce, 2018)
- It is essential to introduce systems in which prior safe lane-crossing spaces are sought and drivers behave collaboratively to avoid sudden manoeuvres near roadworks areas (Ren, Xie, & Jiang, 2021).
- The prior lane-change process is essential to prevent collisions in roadworks areas,(Gan, Weng, Li, & Han, 2020).
- It is necessary to deepen the impact of V2V (vehicle-to-vehicle) and V2I (vehicle-to-infrastructure) technology on vehicles in a roadworks area scenario (Abdulsattar, Mostafizi, Siam, & Wang, 2020).
- In-depth studies of means of protection, such as modular, visible and standardised barriers (Osman Atahan, Arslan, Ganster, & Edl, 2019), represent a significant step forward in protecting road users and workers in roadworks areas.
- There is a correlation between variables such as the severity of injuries and the day, time and place the collision occurs (Wong, Arico, & Ravani, 2011)
- Drivers’ speed in this area is influenced by their perceived actual probability of injuring workers and even damaging their own vehicles. (Kumar Debnath, Haworth, & Bkackman, 2021).

- Other groups such as workers who tow away damaged vehicles need to be trained and skilled in defensive techniques when they are exposed to traffic on the roads. (Chandler & Bunn, 2019).

List of research studies found, conducted in Europe:

Title & Authors	Objective	Year	Country	Download
Road sign vision and driver behaviour in work zones. (Vignali, y otros, 2019)	The effectiveness of roadwork signs on drivers' safety is a poorly investigated topic. The present study examined visual fixations of 29 participants to work zone signs, while driving 27 km along rural roads. The drivers' visual fixations on the work zones signs were recorded with an eye tracking device, synchronized to a GPS recorder that collected kinematic data.	2019	Italy	link

List of research studies found, conducted outside Europe:

Title & Authors	Objective	Year	Country	Download
Spatial-temporal varying coefficient model for lane-changing behaviour in work zone merging areas. (Gan, Weng, Li, & Han, 2020)	This study investigates the lane-changing behaviour in work zone merging areas during the period from the time of starting a lane-changing maneuver to that of completing the lane-changing maneuver. With vehicle trajectory data from short-term work zone sites, we establish a spatial-temporal varying coefficient model considering possible spatial-varying and time-varying effects	2022	China	link
New England Merge: a novel cooperative merge control method for improving highway work zone mobility and safety. (Ren, Xie, & Jiang, 2021)	This research proposes a New England Merge (NEM) for highway work zone control, which requires vehicles to behave cooperatively and create safe merging gaps when approaching lane closure points caused by work zones.	2021	United States	link
Risk to workers or vehicle damage: what makes drivers slow down in work zones? (Kumar Debnath, Haworth, & Bkackman, 2021)	To better understand the factors influencing drivers' speeds in work zones, this paper examined the extent to which drivers' speed choices are influenced by their perceived likelihoods of injuring workers and damaging their own vehicles	2020	Australia	link
Factors contributing to injury severity in work zone related crashes in New Zealand. (Sze & Song, 2018)	This study examined the effect of possible risk factors contributing to severe injury and fatality in work zone related crashes in New Zealand. A multinomial logistic regression model was established to determine the association between crash severity and factors such as road environment, vehicle attributes, driver behaviour, and crash circumstances.	2019	New Zealand	link
Driver responses to graphic-aided portable changeable message signs in highway work zones. (Huang, Bai, & Asce, 2018)	Project aimed to investigate driver responses to graphic-aided PCMSs. Different text and graphic-aided PCMSs representing roadwork and flagger were set up in the upstream of highway work zones, and speed data of more than 2,700 vehicles were collected with a series of five speed sensors to determine vehicle speed reduction. Nearly 1,000 onsite driver surveys were performed to identify driver preference on the added graphics.	2019	United States	link

Title & Authors	Objective	Year	Country	Download
Motor vehicle towing: an analysis of injuries in a high-risk yet understudied industry. (Chandler & Bunn, 2019)	The objectives of the current study are to characterize causal factors associated with injuries among commercial tow truck operators engaged in roadside assistance through analysis of coded and free text data obtained from U.S. Occupational Safety and Health Administration (OSHA) investigation files, and utilize supplemental data sources to analyse environmental factors for injuries in which commercial tow truck operators were struck by roadway traffic.	2019	United States	link
Development of a precast slim temporary concrete safety barrier STCSB 50 for work zone applications. (Osman Atahan, Arslan, Ganster, & Edl, 2019)	Performance requirements and development details of a precast slim temporary concrete safety barrier (STCSB 50), mainly utilized to guide the traffic flow and safely divide lanes on motorways. Having 50 cm in height with a width of only 24 cm at the base and 12 cm throughout its height makes STCSB 50 a very narrow and low-profile work zone barrier.	2019	Turkey	link
Measuring the impacts of connected vehicles on travel time reliability in a work zone environment: an agent-based approach. (Abdulsattar, Mostafizi, Siam, & Wang, 2020)	The objective of this paper is to create an agent-based modelling framework to evaluate the impact of the vehicle to vehicle (V2V) and vehicle to infrastructure (V2I) technology on the mobility performance (i.e., travel time and its reliability) of a two-lane highway work zone scenario.	2018	United States	link
Factors influencing injury severity to highway workers in work zone intrusion accidents. (Wong, Arico, & Ravani, 2011)	The purpose of this research was to perform an analysis of injuries endured by highway workers due to intrusion incidents and to identify factors that would have a significant effect on injury severity.	2011	United States	link

4.1.2.3. BEST PRACTICES AND MEASURES IMPLEMENTED

In this regard, a voluntary service was developed to improve safety at roadworks, as part of the DGT 3.0 connected vehicle platform in Spain, enabling real-time reception and publication of information on the exact location of workers on roads, obtained from connected cones that transmit their geolocation data.

In addition, as regards roadside assistance, as a measure to increase safety for operatives, Royal Decree 159/2021 regulated the conditions under which assistance services that attend collisions or breakdowns are required to carry out their work, driving conditions for breakdown vehicles, and their equipment and markings.

Annex 2 contains detailed information on each of the practices listed.

Measure/action	Coordination	Objective	Source	Country	Download
Connected cones	DGT	To improve the safety of operators working on maintenance or repair work on roads, as well as drivers who will be driving through these work zones.	DGT	Spain	link
Regulation of roadside assistance services	DGT	To improve the safety of roadside assistance service operators who come to the aid of a broken-down vehicle or one that has been involved in a collision, as well as of the people receiving assistance.	DGT	Spain	link
Safety of road workers	Národná diaľničná spoločnosť	National motorway company together with other European highway companies are launching a safety campaign and want to draw the public's attention to the workers who contribute to highway safety.	Národná diaľničná spoločnosť	The Slovak Republic	link
Safety for road workers and safety at road works	Vejdirektoratet	Several manuals and guidelines are published on the Road Standards web page, now also in English as some contractors are foreign. The manuals have comprehensive content with drawings of both stationary and moving road works.	Vejdirektoratet	Denmark	link
The road as a workplace – safety course for contractors	Vejdirektoratet	The course is divided into different levels depending on the level of responsibility of the road worker. The course is followed by a test.	Vejdirektoratet	Denmark	link

4.1.2.4. TECHNICAL REPORTS

Constructive dialogue, the exchange of practices of interest and knowledge, is essential in this field. The conference of directors of roads, held in 2022 and [the subsequent report](#) published in June 2023, revealed the main problems faced by road maintenance workers and how the automotive industry can help to minimise them, such as the development of automatic emergency braking.

Title	Coordinated by	Objective	Year	Download	
CEDR Project Report 2023-01 Incident management and safety at road work locations	CEDR (Conference of European Directors of Roads)	This report authored by Rijkswaterstaat in the Netherlands together with CEDR's WG Road Safety is a follow up on an event in Lelystad, Netherlands on incident management and safety at road work locations the aim of which was the initiation of a constructive dialogue between industry and NRAs on these issues.	2023	link1 link2	

In 2021, the Spanish Directorate-General for Roads issued a memorandum with a series of recommendations for improving safety in maintenance activities and other works impacting the State Road Network.

Title	Coordinated by	Objective	Year	Download	
MEMORANDUM 02/2021 Recommendations to improve safety in maintenance activities and other works impacting the State Road Network	Ministry of transport, mobility and urban agenda. Spain	Measures for their implementation in maintenance and operation (COEX) contracts, in other contracts for engineering services, work or activities that impact roads (inspections, inventories, projects, etc.), in the performance of low-value contracts, in work authorisations for other administrations and companies and in new infrastructure construction works that impact traffic flow on state-owned roads.	2021	link	

4.1.2.5. CONCLUSIONS

In general terms, for this group, the following factors could be taken into consideration if appropriate:

- Increase the understanding of both road users and workers of the safety problem at road works sites through information and awareness campaigns emphasizing the importance of paying attention and reducing speed when approaching road works sites.
- Improve signage, including both physical barriers and signs, to enhance their visibility and clarity, beyond all possible doubt, to alert drivers effectively so they can adapt their driving to this new situation on the road.
- Development of and rolling out technology such as pedestrian and vehicle detection systems.
- Provide comprehensive training for workers, with a particular focus on following all procedures, safety protocols and good practices.
- Research and characterize incidents relating to this group.

4.2. URBAN ROAD SAFETY

Urban environments require a major effort in terms of mobility management, an effort that must take into account the specific characteristics of each city, not only on a physical level, but also on a social and cultural level.

Europe has been, and continues to be, a trailblazer in promoting road safety and sustainable mobility through legislation, awareness-raising campaigns and introducing technological enhancements in cities to improve mobility.

Cities are spaces of coexistence, but coexistence between different modes of transport, such as cars, motorcycles, bicycles and pedestrians, can also give rise to conflict and potential collisions.

As such, careful planning and appropriate infrastructure are required to keep all road users safe.

Cities face a variety of challenges, studied in this document, which specifically analyses three specific groups of growing concern.

Firstly, older people and their relationship with mobility. This is a group that is increasing steadily in the European Union, where the percentage of people over 65 years of age rose from 16% in 2002 to 21% in 2022, according to the European Union [Demography Report 2023](#).

This growth is giving rise to a demographic transformation in the region, where many European countries are implementing policies and programmes to support older people, promote active and healthy ageing and boost social and economic participation for this section of the population, for all of which it is necessary to foster and ensure safe mobility.

Secondly, this document focuses on people with reduced mobility. Guaranteeing mobility for this group is an ethical and social imperative that fosters inclusion and equal opportunities in our societies.

People with disabilities or reduced mobility face additional challenges in their daily lives and, as occurs with the senior community, access to appropriate mobility plays a key role in their quality of life and participation in society. Accessible mobility has a positive impact on emotional and mental well-being for both groups of people.

It is important to recognise that accessible mobility is much more than the presence of appropriate infrastructure, such as ramps, lifts and wide adapted pavements. Policies and services must be in place to ensure equity and dignity for everybody, without regard to their physical abilities.

Thirdly, this report addresses the significant growth in personal light electric vehicles in European cities. These vehicles have become increasingly popular thanks to their practicality, low cost and opportunities for mobility.

This situation has led to a number of changes in urban mobility, even in social habits, offering an alternative to traditional modes of transport, and helping to improving connectivity and last-mile transportation, allowing people to reach their destination faster and with greater flexibility.

On the other hand, however, challenges are emerging, relating primarily to safety, because the coexistence of pedestrians, cyclists, cars and personal light electric vehicles can give rise to situations of conflict and even danger. The lack of clear rules and regulations is a highly topical area of debate and many cities are implementing specific policies and strategies to efficiently integrate personal light electric vehicles in road infrastructure.

As such, these three groups, seniors, people with reduced mobility and users of Personal Light Electric Vehicles, are the object of study in the field of urban road safety in this document.

4.2.1. *OLDER PEOPLE*

It is a well-known fact that Europe is facing significant demographic change with the ageing of its population. In this situation, the question of mobility for older people takes on vital importance to ensure their quality of life and their active participation in society.

Lack of mobility can result in social isolation for this community and the implementation of public policies must take into consideration the fact that older people face safety challenges when they use public transport or drive due to issues of mobility, sight, hearing and longer reaction times.

In terms of urban accessibility, many European cities continue to pose architectural barriers and deficiencies in public transport that make it difficult for older people to move around.

4.2.1.1. DATA ANALYSIS

According to the latest European Commission thematic report on seniors, in Europe over 1 in 4 people killed in road collisions and 1 in 2 pedestrians or cyclists killed in road collisions are aged 65 or over.

The report stresses that, as drivers, older people pose a greater risk to themselves than to others.

Road Safety Thematic Report – Seniors

This report considers seniors as those aged 65 years and over. Health conditions that reduce mobility and increase crash risk can occur at any age, but do so more frequently from 50 years on. The greatest increase in road risk is observed from 75 years on.

Seniors are most at risk in traffic as vulnerable road users (VRU). They form a high proportion of casualties as well as being at significantly greater risk per kilometre travelled.

As car occupants, they are better protected than as VRU and the absolute number of casualties decreases with age. Nevertheless, their risk per distance travelled still increases. As drivers, seniors are a greater risk to themselves than to other road users.

[Link](#)



Reducing older people's death on European Roads – PIN Flash Report 45

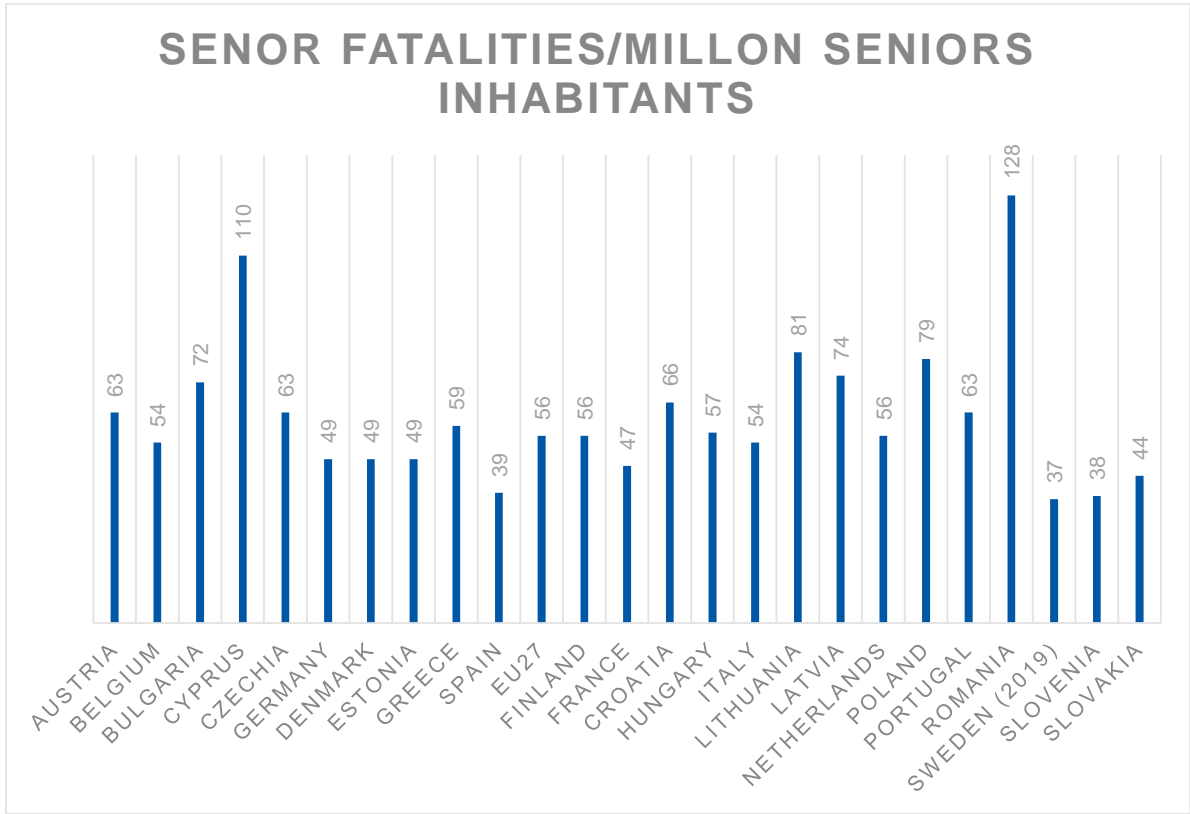
This report delves into the most recent data regarding road deaths among older people across the European Union and other countries participating in the ETSC's Road Safety Performance Index (PIN) program.

Also, the report explores key measures aimed at reducing risks for older road users, encompassing strategies that address behaviour, infrastructure, and vehicle safety. Alongside considerations for older car drivers, such as fitness to drive and training

[Link](#)

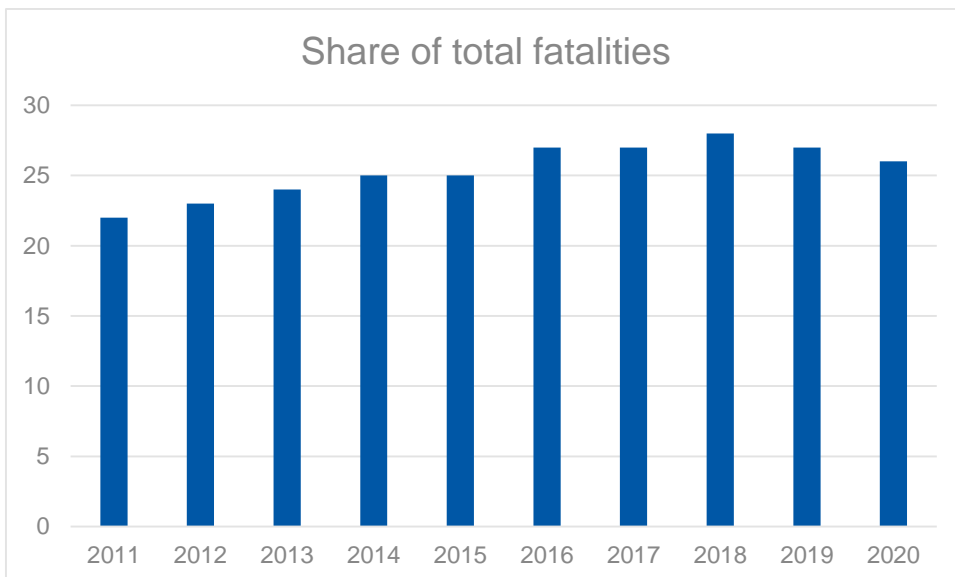


According to the [data provided](#) in the CARE database, the distribution of Senior fatalities per million senior inhabitants per country in the EU27 (2020) is:



Source: CARE, EUROSTAT

The ratio of senior fatalities has remained at around 25% in recent years, with small fluctuations.



Source: CARE

The analysis of collisions shows that when comparing the type of collision in this group with the rest, the collision rate for pedestrians is much higher.

	Car driver	Car passenger	Cyclist	Moped rider	Motorcyclist	Other/unknown	Pedestrian
2011	25%	12%	14%	3%	2%	5%	40%
2012	25%	12%	15%	3%	2%	5%	38%
2013	25%	12%	14%	2%	3%	6%	39%
2014	26%	11%	15%	3%	3%	6%	37%
2015	28%	11%	13%	2%	3%	6%	36%
2016	27%	12%	14%	2%	3%	5%	36%
2017	27%	11%	14%	2%	3%	6%	37%
2018	28%	11%	14%	2%	4%	6%	35%
2019	28%	11%	15%	2%	4%	6%	34%
2020	28%	9%	17%	2%	4%	6%	33%

Distribution of senior fatalities by transport mode in the EU27 (2011-2020).

Source: CARE


	Car driver	Car passenger	Cyclist	Moped rider	Motorcyclist	Other/unknown	Pedestrian
2011	32%	15%	7%	3%	15%	7%	21%
2012	32%	14%	8%	3%	14%	8%	21%
2013	31%	14%	8%	3%	15%	8%	22%
2014	31%	14%	8%	3%	14%	8%	22%
2015	32%	14%	8%	3%	15%	8%	21%
2016	33%	14%	8%	3%	14%	8%	21%
2017	32%	13%	8%	3%	15%	8%	21%
2018	32%	13%	9%	3%	15%	9%	20%
2019	31%	13%	9%	3%	16%	9%	20%
2020	32%	12%	10%	3%	16%	8%	19%

Distribution of all fatalities by transport mode in the EU27 (2011-2020).

Source: CARE

4.2.1.2. EXPERIMENTAL RESEARCH

Among the projects focusing on this group financed by the European Union, the project [SENIORS - Safety-Enhancing Innovations For Older Road users](#) provides tools to encourage broader adoption of advanced pedestrian protection and restraint systems to enhance the protection of vulnerable, older and obese road users.

SENIORS- SAFETY-ENHANCING INNOVATIONS FOR OLDER ROAD USERS	
<p>The SENIORS project focuses on the protection of older and obese road users also by transferring nowadays younger generations' safety standards. The objective is to develop the required understanding of collision scenarios, injury mechanisms and risks and to implement these findings in test tools and test and assessment procedures.</p>	
<p>Program: H2020-EU.3.4.</p>	
	
<p>Coordinated by: Bundesanstalt fuer strassenwesen</p>	<p>Country: Germany</p>
<p>Link</p>	

Literature reviews of the studies published on this subject make it possible to draw some conclusions that are directly applicable to the reduction of on-road collisions involving workers:

- Perception of characteristics of the urban environment acts as a determinant of health and well-being in an ageing population (Gardener & Lemes de Oliveira, 2020)
- The district population variables (density and total inhabitants) have a clear influence on pedestrian collision rates, together with the activity centres associated with older mobility, followed by the ageing rate and the road length per district. (Gálvez-Pérez, Guirgo, & Ortuño, 2021).
- In rural areas, territorial indicators associated to pedestrian mobility such as the physical severance index are revealed as interesting new variables to be considered in future research. (Casado-Sanz, Guirao, & Gálvez-Pérez, 2019).
- As bicycle users, the provision of well-separated cycle paths should be considered a priority in urban planning initiatives aiming to stimulate transportation cycling among older adults. (Van Cauwenberg, De Bourdeaudhuij, Clarys, De Gaus, & Deforche, 2019).
- As regards analysing collision data, it is important to incorporate age - besides collision speed and injury severity - as a plug-in parameter. (Niebhur & Junge, 2017).

List of research studies found, conducted in Europe:

Title & Authors	Objective	Year	Country	Download
Where can the elderly walk? A spatial multi-criteria method to increase urban pedestrian accessibility. (Gaglione, Gargiulo, & Zucaro, 2022)	This study provides a methodology for classifying a neighbourhood as more or less accessible for the elderly to reach urban services on the basis of its favourable characteristics.	2022	Italy	link
Road safety of pedestrians in the urban context: an approach based on infrastructure and socioeconomic variables. (Gálvez-Pérez, Guirgo, & Ortuño, 2021)	Identification of the basic socioeconomic and infrastructure factors that contribute to elder pedestrian incident at urban level, taking the administrative units (districts) as territorial incident location.	2021	Spain	link
Urban environment cues for health and well-being in the elderly. (Gardener & Lemes de Oliveira, 2020)	The primary objective of this review is to establish whether and, if so, how the perception of urban environment features acts as health and well-being determinants in an ageing population.	2020	United Kingdom	link
Population ageing and rural roads: analysis of severity in traffic crashes with older pedestrians on Spanish crosstown roads. (Casado-Sanz, Guirao, & Gálvez-Pérez, 2019)	The objective of the study is to analyse the conditional probability of a fatal outcome in the case of a crash resulting in at least one severe injury.	2019	Spain	link
Older adults' environmental preferences for transportation cycling. (Van Cauwenberg, De Bourdeaudhuij, Clarys, De Gaus, & Deforche, 2019)	A structured questionnaire and choice-based conjoint exercise was completed by 895 Flemish older adults. The conjoint exercise included 13 choice tasks each presenting two street situations, which were manipulated on nine environmental attributes.	2019	Belgium	link
Detection of the toughest: pedestrian injury risk as a smooth function of age. (Niebhur & Junge, 2017)	The present study examines the pedestrian injury risk in full-frontal pedestrian-to-passenger car crashes and incorporates age—in addition to collision speed and injury severity—as a plug-in parameter.	2017	Germany	link

List of research studies found, conducted outside Europe:

Title	Objective	Year	Country	Download
Global burden of road traffic accidents in older adults: a systematic review and meta-regression analysis. (Hong Ang, Sun Chen, & Wen Huey Lee, 2017)	This study aims to estimate the burden of road traffic collisions and death among older adults.	2017	Australia	link




4.2.1.3. BEST PRACTICES AND MEASURES IMPLEMENTED

Among the initiatives included in the European Road Safety Charter, it is worth highlighting one developed in the Czech Republic ([Seniors Without Accidents](#)), a project focusing on transport safety for older people, and those conducted in Belgium and Slovenia to review Road Safety-related knowledge and skills.

Annex 2 contains detailed information on each of the practices listed.

Measure/action	Coordination	Objective	Source	Country	Download
Seniors without accidents	Echopix s.r.o.	SENIOR WITHOUT ACCIDENTS is a unique long-term project focused on transport safety of senior citizens in the Czech Republic. Due to its scope and complexity, this is a globally unique project	European Road Safety Charter	Czech Republic	link
Review of content for older people	Zavarovalnica Triglav Enterprise	Based on a thorough analysis of a very specific target audience and clear objectives, a long-term, individualised, recognisable, measurable and free programme for drivers was developed which could become a model for cooperating with senior drivers in Slovenia.	European Road Safety Charter	Slovenia	link
Senior selftest	F2S2	The project aims to increase awareness among older drivers of the importance of psycho-cognitive factors and their own capacities in relation to collision risk, and therefore safe and comfortable driving	European Road Safety Charter	Belgium	link
Cities 30	DGT	Reducing traffic collisions in urban areas, in particular among vulnerable users.	DGT – Local Councils	Spain	link
Road safety education for seniors and people with reduced mobility	DGT	Building awareness among all those who participate in mobility about their risks and responsibilities in relation to mobility habits and the specific road safety circumstances of seniors and people with reduced mobility.	DGT	Spain	link
Senior mobility, safe mobility	Santalucía & RACE Foundation	Campaign to raise awareness and enhance understanding among the community of people aged over 65 about the risks they may face as pedestrians.	Santalucía & RACE Foundation	Spain	link
In-depth analysis of serious accidents involving elderly car drivers	Danish Accident Investigation Board (AIB)	The Danish AIB investigates serious accidents with the purpose to uncover the accident and injury factors that contributed to the accidents. The Board also presents possible measures that could have prevented the accidents.	Danish Accident Investigation Board (AIB)	Denmark	link
Safety of older people and persons with reduced mobility	Bunderministerium	4th call of the Austrian Road Safety Fund (walking and safe mobility – projects focusing on the elder generation.	Bunderministerium	Austria	link

4.2.1.4. TECHNICAL REPORTS

Title	Coordinated by	Objective	Year	Download	
Road Safety Report 2021	DEKRA	The 2021 DEKRA Road Safety report on older people again underscores the need to pay particular attention to this group in terms of road safety protection.	2021	link	
Safe friendly cities	RACE	Recommendations to be taken into consideration to create safe infrastructures for senior mobility and analyse the involvement of local councils in the field of town planning.	2015	link	
Road design recommendations manual. The senior perspective	MAPFRE FOUNDATION	A study that examines in detail the relationship between the design of streets and roads and the safety of older drivers and pedestrians.	2013	link	

4.2.1.5. CONCLUSIONS

To improve road safety for this group, the following factors could be taken into consideration if appropriate:

- Establishing infrastructure that is friendly to all ages.
- Accessible public transport.
- Carry out awareness-raising programmes both for older people to improve their safety and for others to improve their attitudes and understanding of older people.
- Exploring the possibility of creating personalized transportation services.
- Developing applications and technology to facilitate senior mobility
- Fostering active participation.

4.2.2. *USERS OF REDUCED MOBILITY VEHICLES*

Europe is witnessing significant progress in terms of accessibility for people with reduced mobility. However, despite the regulations and laws requiring certain accessibility standards in public buildings and spaces, many European cities still have significant obstacles for people with reduced mobility.

Public transport is also a major challenge. Although some transportation systems are adapted for people with disabilities, not all cities offer comprehensive solutions to facilitate equal access. This places limits on the mobility and independence of people who rely on wheelchairs or have difficulty moving.

4.2.2.1. DATA ANALYSIS

No specific data have been found.

4.2.2.2. EXPERIMENTAL RESEARCH

Among the projects financed with European funds, the [CITIES-4-PEOPLE](#) project aims to address some of the urban and peri-urban sustainable mobility challenges that are of common interest for cities in the EU. In addition, technology, such as advanced driver assistance systems and how they can foster the inclusion in traffic of people with reduced mobility, is analysed in the project [ADASANDME](#) - Adaptive ADAS to support incapacitated drivers effectively mitigate risks through tailor made hmi under automation

<i>CITIES-4-PEOPLE - NEW APPROACHES FOR COMMUNITY-DRIVEN SUSTAINABLE MOBILITY INNOVATIONS AT NEIGHBOURHOOD AND URBAN DISTRICT LEVEL</i>	
Cities-4-People brings together a multidisciplinary consortium to introduce a community-driven POTM framework based on participatory, inclusive and transparent innovation processes.	
Program: H2020-EU.3.4.	
Coordinated by: Copenhagen business school	Country: Denmark
Start date: June 2017	End date: November 2020
Link	
HORIZON 2020	

<i>ADASANDME - ADAPTIVE ADAS TO SUPPORT INCAPACITATED DRIVERS MITIGATE EFFECTIVELY RISKS THROUGH TAILOR MADE HMI UNDER AUTOMATION</i>	
ADAS&ME (“Adaptive ADAS to support incapacitated drivers &Mitigate Effectively risks through tailor made HMI under automation”) will develop adapted Advanced Driver Assistance Systems, that incorporate driver/rider state, situational/environmental context, and adaptive interaction to automatically transfer control between vehicle and driver/rider and thus ensure safer and more efficient road usage.	
Program: H2020-EU.3.4.	
Coordinated by: Statens vag- och transportforskningsinstitut	Country: Sweden
Start date: September 2016	End date: February 2020
Link	
HORIZON 2020	

Studies on the scope of the current literature on this subject indicate that few high-quality studies on the issue are available (Schwartz, Buliung, Daniel, & Rothman, 2022), making it necessary to conduct further research to engender the establishment of measures to improve mobility for this group.

Studies have been conducted to assess the effectiveness of mobility devices and wheelchairs in general (Brandt, Kreiner, & Iwarsson, 2010)and in special cases such as people with multiple sclerosis (Finlayson, Peterson, & Asano, 2014)

Likewise, the analyses of the difficulties involved in moving around in different environments, especially public transport access areas (Stock, 2023) and the restrictions, both physical and design-related, found in getting from A to B (Harada & Waitt, 2022) demonstrate that there is still a long way to go to improve mobility for people with reduced mobility (Henje, Stenberg, Lundälv, & Carlsoon, 2021).

The research also shows the need for greater scrutiny of collisions involving people using reduced mobility devices (Carlsoon & Lundälv, 2019).

List of research studies found, conducted in Europe:

Title	Objective	Year	Country	Download
Broken elevators, temporalities of breakdown, and open data: how wheelchair mobility, social media activism and situated knowledge negotiate public transport systems. (Stock, 2023)	This paper analyses the significance of disability for urban mobility assemblages by focusing on the uneven encounters of public transport infrastructures, wheelchairs and their users by connecting media studies, STS, and Dis/Ability Studies.	2023	Germany	link
Obstacles and risks in the traffic environment for users of powered wheelchairs in Sweden. (Henje, Stenberg, Lundälv, & Carlsoon, 2021)	The aim of this interdisciplinary qualitative study was to identify obstacles and risks for PWC users by exploring their behaviour and experiences in traffic environments.	2021	Sweden	link
Acute injuries resulting from s involving powered mobility devices (PMDs)—development and outcomes of PMD-related s in Sweden. (Carlsoon & Lundälv, 2019)	The aim of this study is to extract and analyse national PMD-related collision and injury data reported to the Swedish Traffic Accident Data Acquisition (STRADA) database. The results will provide valuable insight into the risks and obstacles that PMD drivers are exposed to in the traffic environment and may contribute to improving the mobility of this group in the long term.	2019	Sweden	link
Advantages and disadvantages of interdisciplinary consultation in the prescription of assistive technologies for mobility limitations. (de Laat, van Heerbeek, & Van Netten, 2017)	The purpose is to explore the advantages and disadvantages experienced by professionals in interdisciplinary consultation involving the user, prescriber and technician in the prescription of assistive technologies for mobility limitations.	2019	The Netherlands	link
Mobility and mobility-related participation outcomes of powered wheelchair and scooter interventions after 4-months and 1-year use. (Lofqvist, Pettersson, Iwarsson, & Brandt, 2012)	The aim was to investigate outcomes of powered wheelchair and scooter interventions after 4-months and 1-year use regarding need for assistance when moving around, frequency of mobility-related participation, easiness/difficulty in mobility during participation, and number of participation aspects performed in everyday life.	2012	Sweden	link
Mobility-related participation and user	The aim of this study was to investigate the constructs of mobility-related participation and user satisfaction, two important outcome	2010	Denmark	link

Title	Objective	Year	Country	Download
satisfaction: construct. validity in the context of powered wheelchair use. (Brandt, Kreiner, & Iwarsson, 2010)	dimensions within praxis and research on mobility device interventions.			

List of research studies found, conducted outside Europe:

Title	Objective:	Year	Country	Download
Geographies, mobilities and politics for disabled people: power-assisted device practice. (Harada & Waitt, 2022)	In this paper, key findings are presented from an Australian Research Council (ARC) Linkage project that investigated the geographies, mobilities and politics for disabled people who roll powered assisted devices (wheelchairs and mobility scooters).	2023	Australia	link
Disability and pedestrian road traffic injury: a scoping review. (Schwartz, Buliung, Daniel, & Rothman, 2022)	A scoping review of academic literature was conducted to understand the state of knowledge on disability and pedestrian-motor vehicle collisions. Sixty-two eligible articles were identified and included. A significantly higher risk of pedestrian collisions, injuries, and fatalities was consistently found among disabled people.	2022	Canada	link
Cross-sectional study examining multiple mobility device use and fall status among middle-aged and older adults with multiple sclerosis. (Finlayson, Peterson, & Asano, 2014)	The aim of this study is to document the prevalence of multiple mobility device use among adults with multiple sclerosis (MS) (≥ 55 years) and examine the association between falls status (faller/non-faller) and the number of mobility devices used.	2017	United States and Canada	link

4.2.2.3. BEST PRACTICES AND MEASURES IMPLEMENTED

The initiatives covered by the European Road Safety Charter notably include the project in Bulgaria (Accessible City Environment District, Triaditza), which makes provision for different actions focused on young people to improve conditions for people with disability.

Although there are numerous local initiatives, emphasis should be placed throughout Europe on the national policies which are gradually extending across the capillary network of cities, such as the [Italian](#) initiative to promote and protect the rights of people with disability and their families. As well as those established in the United Kingdom, with a view to standardising the [charging of electric vehicles to improve accessibility for people with reduced mobility](#) and the [Inclusive Transport Strategy](#), which improves accessibility for people with disability in all types of travel.

The cities that have launched programmes to improve public transport accessibility notably include the cases reported in [Lyon](#), [Thessaloniki](#), [Athens](#), [Paris](#) and [Lasi](#).

Initiatives to improve accessibility with private vehicles, such as the project intended to guarantee parking spaces for this group in [San Sebastian](#), the provision of smart parking spaces for people with reduced mobility in [Valencia](#), and facilitated access to Low Emissions Zones in [Brussels](#).

Other measures reported are intended to improve pavements and accessibility for people in wheelchairs, such as in [Portsmouth](#) and [Sofia](#). The creation of a specific application to improve the mobility of people with reduced mobility in [Ukraine](#), and those intended for the use of shared adapted bicycles in [Hasselt](#) and [Nafplio](#).

Annex 2 contains detailed information on each of the practices listed.


Measure/action	Coordination	Objective	Source	Country	Download
Accessible city environment District Triaditza	Informal Youth Group "Accessible Urban Environment" Association	Actions focused on young people to improve the conditions of people with disability.	European Road Safety Charter	Bulgaria	link
Improved road safety for pedestrians with disability in Ireland - Micromobility	NCBI - National Council for the Blind of Ireland	Actions focused on blind or visually impaired people to allow them to overcome mobility-related barriers that hamper their independence and participation in society.	European Road Safety Charter	Ireland	link
Obstacle-free paths with Team Sidewalk	Symfoon	Obstacle-free paths, making thresholds visible for blind and visually impaired pedestrians by means of a campaign from the perspective of blind and visually impaired public road users.	European Road Safety Charter	Belgium	link
Lyon: putting accessibility at the heart of city life	City of Lyon / stakeholders	The Programme targets the accessibility of public space and municipal institutions, and overall accessibility of life in the city (e.g. culture, education, employment and information).	ELTIS	France	link

Measure/action	Coordination	Objective	Source	Country	Download
Thessaloniki expands audio announcement system at bus stops	Thessaloniki Municipality	Improve accessibility to public transport for people with disabilities. OASTH implemented this feature in compliance with the National Action Plan for the rights of Persons with Disabilities, demonstrating their commitment to supporting individuals with disabilities.	ELTIS	Greece	link
Athens: fully accessible metro station	Athens Municipality	Improve accessibility to public transport for people with disabilities.	ELTIS	Greece	link
Paris: facilitates travel for people with disabilities for Olympic and Paralympic games 2024	Paris Municipality	Improve accessibility to public transport for people with disabilities.	ELTIS	France	link
Transport accessibility for persons with disabilities - public hearing	Brussels Municipality	The aim of the event is to reflect on which steps the EU could take to make progress on this topic, in particular by identifying the existing barriers and obstacles and good practices and to offer a space for debate to organisations representing persons with disabilities and other stakeholders	ELTIS	Belgium	link
Iasi: better accessibility to public infrastructure for disabled people in	Iasi Municipality & APTA Iasi	The city hall has created a working group to continue improving public streets to suit everyone's needs under involvement of APTA.	ELTIS	Romania	link
Italy: single national point to support travel for those with mobility challenges	Ministero delle infrastrutture e dei trasporti	The main goal of the new organisation will be to promote the personal mobility of people with disabilities and those with reduced mobility (PRMs) in order to increase their autonomy and safety when travelling, as well as to facilitate their social and professional integration.	ELTIS	Italy	link
Sofia: Sidewalk renewal programme	Sofia Municipality	To improve the conditions of the sidewalks with a main focus on people with reduced mobility.	ELTIS	Bulgaria	link
Hasselt: e-bikes for people with reduced mobility	Hasselt Municipality	To offer mobility options on electric bicycles for people with disabilities	ELTIS	Belgium	link
Nafplio: bike-sharing system for people with reduced mobility	Nafplio Municipality	To offer mobility options on electric bicycles for people with disabilities	ELTIS	Greece	link
United kingdom: accessibility standards for electric vehicle charging	UK's Department for Transport (DfT)	To make it as easy as possible for EV drivers to charge up their vehicles at public charge points right across the UK, regardless of their mobility and also to provide the transport industry with guidance that will help EV drivers.	ELTIS	United Kingdom	link

Measure/action	Coordination	Objective	Source	Country	Download
Brussels: drivers with reduced mobility in low emission zone	Brussels Municipality	The new exemption will allow drivers with reduced mobility to continue to drive in Brussels, free of sanctions. Specifically, it will apply to those people with a mobility disability who receive an increased contribution from the state for health care.	ELTIS	Belgium	link
Ukraine: app maps accessibility of urban public spaces	Ukrainian disability rights group Dostupno	Interactive map with accessibility information for more than 800 urban locations around the country. These cover urban public spaces, parks, administrative buildings, as well as eating and entertainment venues..	ELTIS	Ukraine	link
UK strategy targets fully accessible transport network by 2030	Department for Transport - UK	To make transport fully accessible for all passengers by 2030	ELTIS	United Kingdom	link
Portsmouth: APP to help wheelchair-users travel	Portsmouth Municipality	The app, called Route4U, is aimed at wheelchair users and provides them with a route map and navigation system. Route4U provides information on the features of the urban environment that are important for those navigating a city in a wheelchair, including pavement obstacles, the quality of the surface, kerb heights, pavement widths, inclines and travel distances.	ELTIS	United Kingdom	link
San Sebastián: sensors on disability parking spaces to counteract illegal parking	San Sebastián Municipality	The installation of smart parking devices is being used in San Sebastian in order to counteract improper use by unauthorised drivers.	ELTIS	Spain	link
Valencia: 1.060 smart parking spaces in a pilot scheme	Valencia's VLCi Impulse smart city initiative – Valencia Municipality	The project will convert 'ordinary' parking spaces into smart ones by installing sensors, which can detect if a space is occupied and share this information. The information is available for everyone and can be easily checked using the municipal web portal(link is external) and the AppValència.	ELTIS	Spain	link
Accesibility for all / Universal design	Danish Road Standards	The Danish Road Standards has developed a quality control system called Accessibility Audit (AA) which helps secure the accessibility for all in road schemes. The audit is carried out at different stages in the design process by certified auditors.	Vejdirektoratet	Denmark	link

4.2.2.4. TECHNICAL REPORTS

The inclusion of people with reduced mobility represents a major challenge, prompting numerous cases of good practice. In February 2023, ITDP (Transportation and Development Policy and World Enabled (The Victor Pineda Foundation) presented the document “[Access and Persons with disabilities in urban areas](#)” in order to promote the establishment of inclusive transport policies.

Title	Coordinated by	Objective	Year	Download	
Access and persons with disabilities in urban areas	Transportation and Development Policy (ITDP) and World Enabled (The Victor Pineda Foundation)	The aim is to promote the establishment of inclusive policies in transport.	2023	link	

4.2.2.5. CONCLUSIONS

In general terms, for this group, the following factors could be taken into consideration if appropriate:

- Fine-tune data gathering and analysis in connection with collision rates among this group, which will serve to better understand the circumstances of collisions and develop more precise and effective prevention strategies.
- Promote the construction and adaptation of road infrastructure, to ensure accessibility for people with reduced mobility.
- Awareness-raising campaigns and training programmes conducted not only for people with reduced mobility, but also society at large.
- Improvements to inclusive public transport, addressing the needs of all, irrespective of their mobility.
- Foster the development of applications and technological devices to facilitate their mobility, access to information and participation in society.
- Adoption of a comprehensive approach to the needs of people with reduced mobility by collaboration among different sectors, such as public, private and non-governmental organizations, together with coordination among different administrations.

4.2.3. *PERSONAL MOBILITY DEVICES*

If there is one mobility-related element which has seen (and continues to see) exponential growth, then it is Personal Mobility Devices (PMD), and specifically e-scooters.

Both shared bicycles and scooters have emerged as a sustainable and efficient alternative to traditional transport. These systems have gained popularity in numerous European cities. Such services allow users to rent a PMD via a mobile app, to be used to get around the city.

However, their rapid growth raises a series of challenges, some of which require urgent attention, above all as regards safety and regulations.

This is therefore an area with numerous initiatives, research studies and projects in progress.

4.2.3.1. DATA ANALYSIS

Shared e-scooters are used mainly for leisure activities, at the weekend, and by young men. Privately owned e-scooters are used most often for travel. The assumption is that the risk of collision is similar to the case of cyclists. A large proportion of PMD impacts are typically caused by falls.

The most common injuries for (shared) e-scooter users are injuries to the head, followed by broken legs and arms, soft tissue injuries, and face and neck injuries and fractures. Evidence suggests that injuries following scooter impacts are more serious than in the case of bicycles.

Most incidents involving an e-scooter do not involve any other highway user.

However, most serious victims (more than 80% of e-scooter user deaths, and 50% of traumatic injuries) are the result of collisions that do involve a heavier motor vehicle.

The proportion of e-scooter users that wear a helmet while riding is very low, even when it is mandatory. Furthermore, many users admit that they tend to travel on the pavement, even when this is not permitted. Head injuries are the most common, with just 4% of e-scooter users wearing a helmet when they were involved in a collision.

Road Safety Thematic Report – Personal Mobility Devices

Personal mobility devices (PMDs) have seen a market boom in recent years. These vehicles are seen as an easy way to travel around the city, and they contribute to solving the “last-mile” problem. This report focuses mainly on electric scooters (e-scooters).



[Link](#)

Meanwhile, another study coordinated by Micro-Mobility for Europe (MMfE) based on more than 240 shared e-scooter journeys, representing more than 461 million kilometres covered, with incident data from 2021, shows that the risk of incidents requiring medical treatment had fallen by 60% compared with 2019. In 2021, 5.1 shared e-scooter injuries per million kilometres travelled required medical assistance. Compared with private e-scooters, it is believed that fatality rates for shared e-scooters are approximately half, although incident data for shared and private e-scooters are often unclear in incident reports.

Factsheet on shared scooter incidents

The MMfE Factsheet injury data suggest that the risk of fatality on shared e-scooters in Europe was 0.015 per 1 million kilometres travelled in 2021 (comparable to the rate for bicycles), and 20 times lower than for mopeds.

[Link](#)

INCIDENT DATA INVOLVING SHARED E-SCOOTERS

About MMfE
Micro-Mobility for Europe (MMfE) is an association of shared micro-mobility providers such as e-bikes and e-scooters. Our members aim to transform urban mobility by creating a sustainable and safe transport ecosystem together with the cities in which they operate. Shared micro-mobility plays an important role in solving urban, social, planning, challenge, traffic, congestion, air and noise pollution by reducing car use and filling gaps in public transport networks.

MMfE takes road safety very seriously. As a member is one of the things that all operators are committed to ensuring the highest level of safety, from vehicle conception to user education and safety incidents. All members monitor safety incidents, broken down into different damage categories, severity levels and root causes. This allows each operator to take the most impactful actions to mitigate incidents as our industry is working towards Vision Zero.


Background
With shared electric scooters being a recent mode of transport, there is little public data on incidents in which they are involved. Public data sources often capture shared e-scooters incident data with private e-scooters data and/or other new modes of transportation (such as motorbikes, electric skateboards, etc.). This factsheet provides the first-of-its-kind industry aggregated incident data involving shared e-scooters. It relies on data from MMfE's six founding members (Bird, Bolt, Lime, Tier, Voi).

Our goal is to shed light on the debate around shared e-scooter safety by providing data in a transparent manner on the volume, severity of incidents, and their implications on the safety of road users. Ultimately, we hope these insights will help inform governments and road safety partners in the EU that reduce incident rates for vulnerable road users, such as shared micro-mobility riders, and we are committed to continue working closely with authorities to do so.

4.2.3.2. EXPERIMENTAL RESEARCH

Regarding research studies in this area, an overview reveals the rapid evolution of this form of mobility, in terms of the topics studied and the date of publication.

Particular mention should be made of the project DREEM - Designing user centric e-kickscooters & business models for enhancing intermodality, financed with European funds with the aim of designing and testing a modular e-kickscooter (e-KS) that would be safer for personal urban and suburban mobility.

DREEM - DESIGNING USER CENTRIC E-KICKSCOOTERS & BUSINESS MODELS FOR ENHANCING INTERMODALITY	
<p>The project aims at finalizing and testing a safer and modular electric kick scooter (e-KS) for personal urban and suburban mobility. It presents 2 main innovation levels: on the vehicle side with the development of new features in term of modularity, foldability and improved safety; on the systemic side, the consortium will study and present (a) new business model(s) for a win-win situation for all stakeholders.</p>	
<p>Program: H2020-EU.3.4.</p>	
	
Coordinated by: PUNCH TORINO SPA	Country: Italy
Start date: February 2021	End date: January 2023
<p>Link</p>	

With regard to the studies found, although those from the previous decade aimed to research user satisfaction with the characteristics of e-scooters, frequency of use and factors predicting daily use of the scooter (Sund & Brandt, 2018), or the general appraisal of e-scooter users (Hardt & Bagenberger, 2019) since 2020 we have begun to see studies focused on researching the challenges associated with the introduction of e-scooters into cities (Gössling, 2020) and initial analyses of collisions and their association with risk behaviours. (Gioldasis, Chistoforou, & Seidowski, 2021)

The increase in collisions and injuries has given rise to studies intended to analyse the injuries occurring, focused mainly on head injuries (Serra, Fernandes, Noronha, & Alves de Sousa, 2021) and orthopaedic injuries (Hourston, Ngu, Hopkinson-Woolley, & Stöhr, 2021), as well as those suffered by children (Morgan, y otros, 2022).

Studying and minimising impacts on the head has become a priority, the aim being to characterise the biomechanics of the head-ground impact and to evaluate the protection offered by cycling helmets in typical falls from e-scooters. (Wei, Petit, Arnoux, & Bailly, 2023) with specific neuro-surgical research being recommended for future research projects (Rashed, Vassiliou, & Barber, 2022)

Lastly, studies are undertaken with a focus on speed limits in accordance with usage zones (Caggiani, Camporeale, Di Bari, & Ottomanelli, 2022) and the effects of e-scooter and pedestrian coexistence (Sucha, Drimlová, & Recka, 2023).

List of research studies found, conducted in Europe:

Title & Authors	Objective	Year	Country	Download
Association of Night time Speed Limits and Electric Scooter–Related Injuries. (Liukkonen, Aarnikko, & Stenman, 2023)	A total of 654 patients (mean [SD] age, 28.7 [10.6] years; 382 [58.4%] male) experienced an e-scooter–related injury during the summer periods between 2019 and 2022. During those periods, a total of 3 556 929 rides with 7 287 027 km of distance were driven. The mean total incidence was 18.39 (95% CI, 17.00 to 19.58) injuries per 100 000 rides and 8.97 (95% CI, 8.30 to 9.69) injuries per 100 000 km driven. The mean injury incidence was lowest in 2019 (16.94 [95% CI, 13.34-21.20] per 100 000 rides) and highest in 2020 (25.0 [95% CI, 20.56-30.10] per 100 000 rides). The injury incidence was similar in the years 2021 (17.75 [95% CI, 15.75-20.58] per 100 000 rides) and 2022 (17.34 [95% CI, 15.23-19.65] per 100 000 rides). The mean distance per ride decreased every year, and hence the mean injury incidence per 100 000 km increased almost 2-fold from 5.63 (95% CI, 4.43-7.04) in 2019 to 10.43 (95% CI, 9.16-11.82) injuries per 100 000 km in 2022.	2023	Finland	link
E-scooters and other mode trip chaining: preferences and attitudes of university students. (Nikiforiadis, y otros, 2023)	This study focuses on university students, since they constitute a large proportion of the shared e-scooters market share, and examines their willingness to use shared e-scooters for intermodal trips and their attitudes regarding issues of equity and safety. A survey of 594 university students in the city of Thessaloniki was conducted and their responses were analysed using descriptive statistics and discrete choice model analyses.	2023	Greece	link
E-scooter riders and pedestrians: attitudes and interactions in five countries. (Sucha, Drimlová, & Recka, 2023)	This study describes the possible effects of the emergence of e-scooters on pedestrians. We focus on the interaction, conflicts, crashes, and attitudes between pedestrians and e-scooter riders and pedestrians' perceived safety in the presence of e-scooters. Data were collected from e-scooter riders and non-riders (n = 3385) through an online survey in Australia, Belgium, the Czech Republic, Norway, and Sweden.	2023	Belgium, Czech Republic, Norway, Sweden, Australia	link
A geofencing-based methodology for speed limit regulation and user safety in e-scooter sharing systems. (Caggiani, Camporeale, Di Bari, & Ottomanelli, 2022)	This paper proposes a methodology, based on geofencing technology (i.e., virtual geographic boundaries) to define in which urban areas the speed of shared electric scooters should be limited	2023	Italy	link
Head-ground impact conditions and helmet performance in e-scooter falls. (Wei, Petit, Arnoux, & Bailly, 2023)	This study aims to characterize the head-ground impact biomechanics and evaluate bicycle helmet protection in typical E-scooter falls.	2023	Germany	link

Title & Authors	Objective	Year	Country	Download
Evaluation of electric scooter deployment in the City of Helsinki. (Mladenović, Dibaj, & Lopatnikov, 2022)	The study finds that the safety level of e-scooter usage has improved over time. With 148 emergency cases between January and August 2022, the estimates are approaching the same level of safety as cycling in Helsinki. Nonetheless, intoxication while riding has remained an obvious issue also in 2022, with an estimate of 35 % of those injured being intoxicated. In addition, the e-scooter observations revealed that while half of the e-scooter riders showed adequately safe riding, about a quarter of riders showed various unsafe riding behaviours.	2022	Finland	link
Incidence of Electric Scooter–Associated Injuries in Finland from 2019 to 2021. (Reito, Öljymäki, Franssila, & Mattila)	562 patients with 594 ED visits were identified matching the search terms. Of these, 331 patients (335 visits) presented because of an e-scooter-related injury, based on manual abstraction. In total, 147 (44.4%) of the visits occurred between midnight and 6:00 AM. A total of 527 injuries were diagnosed in 331 patients. Any fracture or dislocation occurred in 103 patients (31.1%). Of these, distal radius fracture and clavicle fracture (13 patients [12.6%] each) were the most common. During the study period, 1 862 778 trips were made and 4 592 549 km were driven on e-scooters. The incidence of any injured riders requiring admittance to the ED during the study period was 18.0 (95% CI, 16.2-20.0) per 100 000 rides and 7.3 (95% CI, 6.6-8.1) per 100 000 km driven. The incidence of patients with major trauma was 5.9 (95% CI, 4.9-7.1) per 100 000 rides and 2.4 (95% CI, 2.0-2.9) per 100 000 km driven.	2022	Finland	link
Neurosurgical trauma from e-scooter usage: a review of early case series in London and a review of the literature. (Rashed, Vassiliou, & Barber, 2022)	This work offers a foundational text highlighting the frequency and severity of neurotrauma seen with E-scooter usage. Injury is seen in E-scooter riders, passengers and pedestrians alike with dangerous riding behaviours likely contributory. A neurosurgical-specific inquiry is recommended for future research.	2022	United Kingdom	link
Pediatric electric scooter injuries in the UK: case series and review of literature. (Morgan, y otros, 2022)	At present, there is no data published looking at pediatric e-scooter injuries within the UK. The aim of this study is to assess if e-scooters pose a risk to children and the patterns and severity of orthopedic injuries related to their use.	2022	United Kingdom	link
Risk-taking behaviours of e-scooter users: a survey in Paris. (Gioldasis, Chistoforou, & Seidowski, 2021)	Undertook a face-to-face road survey (N = 459) in order to explore incident involvement history, driving attitudes and perceived risk among e-scooter users in Paris, France. Three risk factors were specifically explored: (i) riding after having consumed alcohol, (ii) riding after having consumed drugs, and (iii) using the smartphone while riding.	2021	France	link
Orthopedic injuries associated with use of electric scooters in the UK: a dangerous trend? Case series and review of the literature. (Hourston, Ngu, Hopkinson-Woolley, & Stöhr, 2021)	This study investigates patients from Electric scooters (e-scooters) collisions by reviewing the records of patients, a Level 1 Major Trauma Center in the United Kingdom, with orthopedic injuries associated with e-scooter use.	2021	United Kingdom	link

Title & Authors	Objective	Year	Country	Download
Head protection in electric micromobility: a critical review, recommendations, and future trends. (Serra, Fernandes, Noronha, & Alves de Sousa, 2021)	A comprehensive review is carried out focusing on head protection for EMM, mostly for e-scooters, and the respective target markets, safety measures, and existing regulations.	2021	Portugal	link
Integrating e-scooters in urban transportation: problems, policies, and the prospect of system change. (Gössling, 2020)	This paper investigates the challenges associated with the introduction of e-scooters in ten major cities, based on a content analysis of local media reports.	2020	Sweden	link
Usage of e-scooters in urban environments. (Hardt & Bagenberger, 2019)	Results of a real-life field test, performed in the City of Munich, Germany. By providing six vehicles, 38 subjects were able to incorporate an e-scooter into their everyday lives. Recorded with travel diaries and a pre-post-survey, usage and attitudes were evaluated.	2019	Germany	link
Adult Scandinavians' use of powered scooters: user satisfaction, frequency of use, and prediction of daily use. (Sund & Brandt, 2018)	The purpose is to investigate user satisfaction with characteristics of powered scooters (scooters), frequency of use, and factors predicting daily scooter use.	2018	Norway	link

4.2.3.3. BEST PRACTICES AND MEASURES IMPLEMENTED

In April 2023, the Road Safety Agency of Slovenia and Zavod VOZIM, the national coordinator of the European Road Safety Charter, staged the international conference [“The Future of E-scooters in Slovenia”](#).

At the overarching level, mention should be made of the National Plan to Regulate the Use of E-scooters produced by the Ministry of Transport in France, which sets out a series of measures and establishes practices of interest, including the creation of a specific monitoring body for micro-mobility.

Lastly, the General Directorate of Traffic in Spain has, following the implementation of [specific regulations for this type of vehicle](#), conducted an [information campaign](#) in order to publicise the measures among all users, through a range of actions deployed in Spanish towns and cities.

Among the initiatives recorded in the European Road Safety Charter, the report [First-of-its-kind incident data involving shared e-scooters](#) aims to provide information from the perspective of shared micromobility providers on road safety policies intended to reduce the risk of incidents for vulnerable road users, such as e-scooter users, cyclists and pedestrians, in partnership with the EU and local authorities.

Other notable initiatives include the campaign Preventing drink-driving among young e-scooter drivers - TIER [“anti-drink-riding” app](#), which comprises an app that aims to prevent alcohol consumption and practices connected with scooter riding through the use of alternative vehicles, or practical training such as the [Practical training in the use of Personal mobility devices, e-scooters and scooters](#), or otherwise a focus on [training of last-mile workers](#).

Annex 2 contains detailed information on each of the practices listed.

Measure/action	Coordination	Objective	Source	Country	Download
Preventing drink-driving among young e-scooter drivers - tier “anti-drink-riding” app	TIER Mobility	The objectives of the anti-drinking and riding campaign are as follows: 1. Remind riders about the dangers of drinking and riding and e-scooter. 2. Encourage riders to take a taxi home if they have then drinking, rather than take a Scooter 3. Make it as easy as possible for riders to get home quickly if they have been drinking.	European Road Safety Charter	Germany	link
Specific legal framework and Specifications Manual of Personal mobility devices (PMD)	DGT	Provide Personal mobility devices with a specific and uniform legal framework. Identify the models of personal mobility vehicle (PMD) and ensure that they comply with the technical requirements imposed by national and international regulations.	Ministry of the Interior - Spain	Spain	link1 link2
“No go” campaign to protect pedestrians	DGT	Communication campaign intended to raise awareness as to respect for pedestrian mobility, reminding users that pavements are a space exclusively intended for journeys on foot.	Ministry of the Interior - Spain	Spain	link

Measure/action	Coordination	Objective	Source	Country	Download
National E-scooter Regulation Plan	Ministère des Transports - France	Establishment of regulatory measures together with commitments by operators in order to improve the safety of users and also other users, guaranteeing better integration within public spaces, while also underpinning the environmental performance of such forms of mobility.	Ministry of Transport - France	France	link
International conference 'the future of electric scooters in Slovenia'	Zavod VOZIM (DRIVing, Institute for innovative education)	The Slovenian Traffic Safety Agency and Zavod VOZIM, the national coordinator of the European Road Safety Charter, carried out an international conference "The future of electric scooters in Slovenia".	European Road Safety Charter	Slovenia	link
Practical training in the safe use of electric scooters, skateboards and Personal mobility devices	Educatraffic Foundation	Training program for people from the age of 16 and the training takes place at a closed circuit to simulate an open road environment safely. Multiple scenarios are experienced from simulation goggles for alcohol consumption to balance tests.	European Road Safety Charter	Spain	link
Takeve, a unique, ethical, inclusive and safe delivery model	TAKEVE	Training for last-mile workers	European Road Safety Charter	Italy	link
Safety for e-scooters	Ministerstvo vnútra SR	To draw an attention to correct riding on e-scooters and to correct parking of e-scooters	Ministerstvo vnútra SR	The Slovak Republic	link
Evaluation of the e-scooter pilot scheme	Færdselsstyrelsen	The evaluations are intended as indicators to follow the progress on areas like usage, behaviour, accidents and environmental impact of e-scooters. Based on the evaluations assessments are made as to whether the legislation needs to be changed or other measures have to be taken to maintain a high level of road safety.	Færdselsstyrelsen	Denmark	link
SEED – Safe e-scooter driving	AIT Austrian Institute of Technology	Objective measurement and analysis methods are used to collect and evaluate vehicle dynamics data. It is important to be comparable in terms of road safety, such as braking distance or safe manoeuvres in special situations. This can be achieved by creating and conducting uniform and therefore comparable course tests.	AIT Austrian Institute of Technology	Austria	link
Evaluation report - scientific research of the participation of personal light electric vehicles in public road traffic	Bast	The Federal Ministry for Digital and Transport will review the Regulations in terms of their effectiveness, objectives and impact on road safety, based in particular on the results of supporting scientific research. On the basis of this assessment, the Federal Ministry for Digital and Transport shall, if appropriate, submit a proposal to amend this Regulation.	Bast	Germany	link

4.2.3.4. TECHNICAL REPORTS



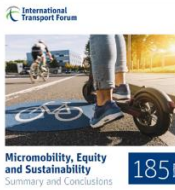
Many organisations have published guidelines on how to incorporate personal mobility devices safely into the mobility mix, especially in cities. For instance, [one of the topic guides on Sustainable Urban Mobility Plans is on the subject of the safe use of micromobility.](#)

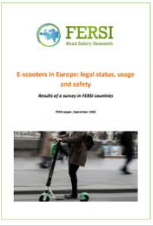



Road safety advocates have established a series of [recommendations to improve safety in connection with this type of vehicle](#), such as the ETSC (European Transport Safety Council), which emphasises the need for further research and data so as to understand the quantity, types and mechanisms of the injuries that occur, and to improve our understanding of the mechanisms of head and face injuries.

In September 2020, FERSI launched the report [E-Scooters in Europe: legal status, usage and safety](#) indicating the legal status, use and safety of e-scooters in 18 European countries. The report highlighted differences in aspects such as the legal status of such vehicles, road usage, speed limit, mandatory helmet use and other aspects.

This is a reality which goes far beyond European boundaries - the GHSA (Governance Highway Safety Association) in 2022 published [Understanding and tackling micromobility: transportation's new disruptor](#), indicating the concerns which exist at the global level in terms of safety, infrastructure, regulatory problems and the role played by shared vehicle companies on the micromobility market.

There are already successful micromobility initiatives which have been launched in European cities and could provide guidance for implementation in other cities: [Macro managing micro mobility - taking the long view on short trips](#), while other initiatives beyond the scope of Europe are presented in the [Safe Micromobility](#) Report produced by the ITF (International Transport Forum).

Title	Coordinated by	Objective	Year	Download	
Recommendations on safety of e-scooters	ETSC	The aim is to set out recommendations for improving the safety of probably the largest and fastest growing of these new micromobility vehicles: the e-scooter.	2023	link	
SUMP Topic Guide – Safe Use of Micromobility Devices in Urban Areas	CIVITAS/ELTIS	Guide local authorities in how best to incorporate micromobility devices into safe urban planning.	2021	link	
Micromobility, equity and sustainability roundtable (virtual meeting)	ITF	The target of this roundtable was to discuss the topic of "Micromobility, Equity and Sustainability" and to provide a platform for policymakers, experts, and stakeholders to exchange ideas and best practices on this topic.	2021	link	

Title	Coordinated by	Objective	Year	Download	
E-scooters in Europe: legal status, usage and safety	FERSI	The aim is to make an inventory of the information available in the FERSI member countries.	2020	link	
Understanding and tackling micromobility: transportation's new disruptor	GHSA	The report aims to foster discussion and action that advances the safety of all roadway users.	2020	link	
Safe micromobility	ITF	Establish policies to improve the road safety of microvehicles	2020	link	
Macro managing micro mobility - taking the long view on short trips	POLIS	The paper provides insights on the companies behind the micro mobility trend, potential benefits and drawbacks of micro mobility for cities and their residents, and effective ways for cities to manage and regulate micro mobility to ensure safety and sustainability.	2019	link	

4.2.3.5. CONCLUSIONS

Personal mobility devices represent significant progress within the realm of urban mobility in Europe, providing sustainable and efficient options to get around within cities. However, challenges have also arisen in connection with regulations, safety, coexistence and the economic sustainability of shared services. Overcoming these challenges requires collaboration among authorities, PMD companies, users and society at large, to guarantee safe, sustainable and inclusive personal mobility in European cities.

The suggested needs regarding this group could be as followed if appropriated:

- Establish clear and updated regulations for PMD travel on public roads, guaranteeing the safety of PMD users and other road users.
- Pursue solutions with regard to infrastructure, integration with public transport and coexistence with other vehicles, allowing the integration of this type of vehicle.
- Education and awareness-raising campaigns conducted to inform PMD users about traffic rules, safety, and respect for other road users.
- Ensure that PMDs are accessible to all, including persons with reduced mobility, through the design and adaptation of accessible models.
- Implement control and inspection systems that guarantee compliance with the existing regulations, and promote responsible use of PMDs.

5. ANNEX 1. CATALOGUE OF ACTIONS

DATA ANALYSIS

PEDESTRIANS ON ROAD	Road Safety Thematic Report – Pedestrians	Link
	Pedestrian casualty figures – Spain	Link
ROAD WORKERS	Prevention in infrastructure maintenance and operations work	Link
OLDER PEOPLE	Road Safety Thematic Report – Seniors	Link
OLDER PEOPLE	Reducing older people´s death on European Roads – PIN Flash Report 45	Link
PMD	Road Safety Thematic Report – Personal Mobility Devices	Link
	Factsheet on shared scooter accidents	Link

EXPERIMENTAL RESEARCH – EU-FUNDED PROJECTS

PEDESTRIANS ON ROAD	DeepSight - Detection of pedestrians and cyclist outside a line of sight	Link
	SSVPI - Safety in Smart Vehicle - Pedestrian Interaction	Link
ROAD WORKERS	SAFELANE – An all-encompassing, intelligent safety and asset management system for highway maintenance	Link
	ZIMASS - Smart Mobile awareness and safety system for workzone invasion	Link
	InfraROB - Maintaining integrity, performance and safety of the road infrastructure through autonomous robotized solutions and modularization	Link
OLDER PEOPLE	SENIORS- Safety-ENhancing Innovations for Older Road userS	Link
REDUCED MOBILITY VEHICLE USERS	Cities-4-People - New approaches for community-driven sustainable mobility innovations at neighbourhood and urban district level	Link
	ADASANDME -Adaptive ADAS to support incapacitated drivers Mitigate Effectively risks through tailor made HMI under automation	Link
PMD	DREEM - Designing useR centric E-kickscooters & business models for Enhancing interModality	Link

EXPERIMENTAL RESEARCH – PROYECTOS DE INVESTIGACIÓN PUBLICADOS EN EUROPA

PEDESTRIANS ON ROAD	Deliberate fatal crashes involving a motor vehicle and a cyclist or pedestrian	Link
	Analysis of contributory factors of fatal pedestrian crashes by mixed logit model and association rules	Link
	Adaptive Visual Assistance System for Enhancing the Driver Awareness of Pedestrians	Link
	Avoiding manoeuvre when faced with an unexpected versus likely pedestrian	Link
	Epidemiology of pedestrian–MVCs by road type in Cluj, Romania	Link
	Traffic and the risk of vehicle-related pedestrian injury: a decision analytic support tool	Link
ROAD WORKERS	Road sign vision and driver behaviour in work zones	Link
OLDER PEOPLE	Where can the elderly walk? A spatial multi-criteria method to increase urban pedestrian accessibility	Link
	Road safety of elderly pedestrians in the urban context: an approach based on infrastructure and socioeconomic variables	Link
	Urban environment cues for health and well-being in the elderly	Link
	Population ageing and rural road accidents: Analysis of accident severity in traffic crashes with older pedestrians on Spanish crosstown roads	Link
	Older adults' environmental preferences for transportation cycling	Link
	Detection of the toughest: Pedestrian injury risk as a smooth function of age	Link
REDUCED MOBILITY VEHICLE USERS	Mobility-related participation and user satisfaction: Construct validity in the context of powered wheelchair use	Link
	Mobility and mobility-related participation outcomes of powered wheelchair and scooter interventions after 4-months and 1-year use	Link
	Broken elevators, temporalities of breakdown, and open data: how wheelchair mobility, social media activism and situated knowledge negotiate public transport systems	Link
	Obstacles and risks in the traffic environment for users of powered wheelchairs in Sweden	Link
	Acute injuries resulting from accidents involving powered mobility devices (PMDs)—Development and outcomes of PMD-related accidents in Sweden	Link

	Advantages and disadvantages of interdisciplinary consultation in the prescription of assistive technologies for mobility limitations	Link
PMD	E-scooters and other mode trip chaining: Preferences and attitudes of university students	Link
	E-scooter riders and pedestrians: Attitudes and interactions in five countries	Link
	A geofencing-based methodology for speed limit regulation and user safety in e-scooter sharing systems	Link
	Head-ground impact conditions and helmet performance in E-scooter falls	Link
	Neurosurgical trauma from E-Scooter usage: a review of early case series in London and a review of the literature	Link
	Pediatric electric scooter injuries in the UK: Case series and review of literature	Link
	Risk-taking behaviours of e-scooter users: A survey in Paris	Link
	Orthopedic injuries associated with use of electric scooters in the UK: A dangerous trend? Case series and review of the literature	Link
	Head protection in electric micromobility: A critical review, recommendations, and future trends	Link
	Integrating e-scooters in urban transportation: Problems, policies, and the prospect of system change	Link
	Usage of e-Scooters in Urban Environments	Link
Adult Scandinavians' use of powered scooters: user satisfaction, frequency of use, and prediction of daily use	Link	

EXPERIMENTAL RESEARCH – PROYECTOS DE INVESTIGACIÓN PUBLICADOS FUERA DE EUROPA

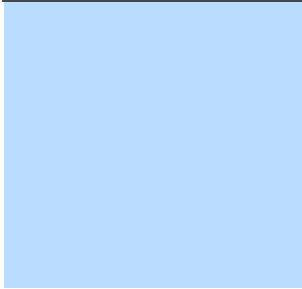
PEDESTRIANS ON ROAD	In-depth approach for identifying crash causation patterns and its implications for pedestrian crash prevention	Link
ROAD WORKERS	New England merge: a novel cooperative merge control method for improving highway work zone mobility and safety	Link
	Factors Influencing Injury Severity to Highway Workers in Work Zone Intrusion Accidents	Link
	Risk to workers or vehicle damage: What makes drivers slow down in work zones?	Link
	Measuring the impacts of connected vehicles on travel time reliability in a work zone environment: an agent-based approach	Link
	An alternative design for traffic intersections with work zones by using pre-signals.	Link
	Factors contributing to injury severity in work zone related crashes in New Zealand	Link
	Motor vehicle towing: an analysis of injuries in a high-risk yet understudied industry	Link
	Development of a precast slim temporary concrete safety barrier STCSB 50 for work zone applications	Link
	Driver responses to graphic-aided portable changeable message signs in highway work zones	Link
	Spatial-temporal varying coefficient model for lane-changing behaviour in work zone merging areas	Link
Effects of cooperative vehicle infrastructure system on driver's attention--A simulator study on work zone	Link	
OLDER PEOPLE	Global burden of road traffic accidents in older adults: A systematic review and meta-regression analysis	Link
REDUCED MOBILITY VEHICLE USERS	A cross-sectional study examining multiple mobility device use and fall status among middle-aged and older adults with multiple sclerosis	Link
	Geographies, mobilities and politics for disabled people: power-assisted device practice	Link
	Disability and pedestrian road traffic injury: A scoping review	Link

BEST PRACTICES AND MEASURES IMPLEMENTED

PEDESTRIANS ON ROAD	DGT 3.0 connected vehicle platform and V16 signal	Link
	Pedestrian safety - shared responsibility	Link
	Luminescent road markings	Link
	SAFE-UP Project	Link
	Geolocalization of accidents	Link
	Adaptation of roads in areas near pedestrian crossings	Link
	Pedestrian masterplan walking agenda 2030	Link
	SHADAR Project	Link
ROAD WORKERS	Connected cones	Link
	Regulation of assistance services on public roads	Link
	Safety of road workers	Link
	Safety for road workers and safety at road works	Link
	The road as a workplace. Safety course for contractors	Link
OLDER PEOPLE	Seniors without accidents	Link
	Review of content for elderly people	Link
	Senior selftest	Link
	Cities 30	Link
	Road safety education for seniors and people with reduced mobility	Link
	Senior mobility, safe mobility	Link
	In-depth analysis of serious accidents involving elderly car drivers	Link
	Safety of older people and persons with reduced mobility	Link
REDUCED MOBILITY VEHICLE USERS	Accessible city, district of Triaditza	Link
	Improved road safety for pedestrians with disability in Ireland - Micromobility	Link
	Obstacle-free paths with Team Sidewalk	Link
	Lyon: accessibility in the heart of the city	Link

	Thessaloniki: audio information system at bus stops	Link
	Athens: fully accessible metro station	Link
	Paris: facilitate travel by people with disability during the 2024 Olympic and Paralympic games	Link
	Brussels: public conference on accessibility in transport for people with disabilities	Link
	Iași: improved accessibility to public infrastructure for people with disabilities	Link
	Italy: single national support point for travel by people with reduced mobility	Link
	Sofia: pavement improvement programme	Link
	Hasselt: e-bikes for people with reduced mobility	Link
	Nafplio: shared bike system for people with reduced mobility	Link
	United Kingdom: standards to improve accessibility at electric vehicle charging points	Link
	Brussels: access to low emissions zones for drivers with reduced mobility	Link
	Ukraine: urban public space accessibility map application	Link
	United Kingdom: goal of complete public transport accessibility by 2030	Link
	Portsmouth: application for wheelchair users	Link
	San Sebastián: sensors in disabled parking bays to combat illegal parking	Link
	Accessibility for all/universal design	Link
PMD	Prevention of alcohol consumption among young scooter riders: "anti-drink-riding" app	Link
	Specific legal framework and Specifications Manual of Personal mobility devices (PMD)	Link
	"No go" campaign to protect pedestrians	Link
	National E-scooter Regulation Plan	Link
	International conference: "The future of e-scooters in Slovenia"	Link
	Practical training in the use of Personal mobility devices, e-scooters and scooters	Link

	Takeve, a unique, ethical, inclusive and safe delivery model	Link
	Safety of e-scooters	Link
	Evaluation of the e-scooter pilot scheme	Link
	SEED – Safe e-scooterdriving	Link
	Evaluation report - scientific research of the participation of personal light electric vehicles in public road traffic	Link



TECHNICAL REPORTS

PEDESTRIANS ON ROAD	Pedestrian safety: a road safety manual for decision-makers and practitioners	Link
ROAD WORKERS	CEDR Project Report 2023-01 Incident and safety management in roadwork areas	Link
	Recommendations to improve safety in maintenance activities and other works impacting the State Road Network	Link
OLDER PEOPLE	Road design recommendations manual. The senior perspective	Link
	Road Safety Report 2021	Link
	Safe friendly cities	Link
REDUCED MOBILITY VEHICLE USERS	Access and people with disability in urban areas	Link
PMD	E-scooter safety recommendations	Link
	<i>Safe use of micromobility devices in urban areas</i>	Link
	E-scooters in Europe: legal status, usage and safety	Link
	Understanding and addressing micromobility: the new transport disrupter	Link
	Macromanagement of micromobility: a scope perspective for short trips	Link
	Micro-mobility, equity and sustainability	Link
	Safe micro-mobility	Link

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Good road safety practices in the following areas:

Pedestrians and road workers on inter-urban roads

**Older people, people with reduced mobility
and PMD users in urban areas.**

EXECUTIVE SUMMARY

April 2024

EXECUTIVE SUMMARY

This document analyses five very specific cases of exposure to risk and potential collisions.

- Inter-urban areas, high-capacity roadways (collisions affecting pedestrians and workers employed on such roadways)
- Urban areas (users with reduced mobility, older people and users of Personal mobility devices)

1. Pedestrians on inter-urban roads.

The report focuses on drivers travelling on a road who are at some point forced to leave their vehicle for some reason, whether because of a crash or a breakdown.

Several factors contribute to this vulnerability, drivers are often taken by surprise when they encounter a pedestrian on the road as this is not an everyday occurrence and, in the worst cases, it can result in sudden evasive manoeuvres or even collisions.

When vehicles stop on the carriageway, and the driver or passengers then alight, this may entail negative consequences above all if it takes place in dangerous areas, such as on bends, at junctions or in the middle of the carriageway.

Meanwhile, pedestrian protection is essentially confined to making oneself seen by drivers, a task which on occasion, such as low levels of light, reflection or adverse meteorological phenomena, becomes more challenging.

This is, then, a situation in which pedestrian safety depends on two factors: first of all, minimising their exposure to the risk by remaining on the carriageway for as short a time as possible, and making sure they are seen; and furthermore, once they have been detected by the driver, trusting that the latter will have the capacity and sufficient time to avoid a collision.

In both cases, technology provides important support and is even able to prevent collisions.

The search yielded initiatives with a specific focus on preventing this risk, ranging from systems to improve the visibility of pedestrians and vehicles stopped on the road to others based on developing systems to assist drivers and alert them to the presence of pedestrians.

The projects financed with European funds studying the safety situation of pedestrians represent a major step forward in the prevention of road collisions. Projects focused on early detection of pedestrians, in both good and poor visibility conditions ([Detection of pedestrians and cyclists outside a line of sight](#)), offering solutions to assist drivers in their decision-making.

The [Safety in Smart Vehicle - Pedestrian Interaction](#) project aims to improve the detection of pedestrians on roads by applying algorithms that are able to predict the intentions of pedestrians on a road, even in low visibility conditions.

The [latest thematic report on pedestrians](#) coordinated by the European Commission, provides a general indication of the main causes of collisions involving pedestrians, most notably two key factors, distraction and speed. These two aspects are exacerbated on roads, leading to a significant increase in the risk of collision and the severity of injuries.

In the good practices section, efforts focus on promoting pedestrian awareness and education, and extending such efforts beyond urban areas.

The research into vehicle-pedestrian collision allows us to draw a number of conclusions which can be directly applied to highway collision rates.

The use of different models aims to discriminate all the possible variables so as to characterise pedestrian collisions as far as possible, with the goal of developing effective countermeasures on each scenario (Riccardi, Mauriello, Scarano, & Montella, 2023).

Studies focussing on studying driver perception (Frémont, Phan, & Thouvenin, 2020) and attention (Galy, Motak, & Berthelon, 2023) in response to unexpected events such as the presence of a pedestrian, offer significant conclusions in better understanding the process which occurs prior to a possible incident.

Other studies drill down into patterns of causality and typical scenarios, to conduct a detailed study of each (Yue, Abdel-Aty, Wu, Zheng, & Yuan, 2020). Analyses of the scenarios where collisions occur and forecasts for the implementation of various policies are also the subject of studies (Chalabi, Roberts, Edwards, & Dowie, 2008) of value for decision makers in this field.

Lastly, certain more specific cases, which are nonetheless also of importance in this area, have been the subject of study, as in the case of collisions deliberately caused by pedestrians on the highway (Radun, Radun, Sutela, & Tolvanen, 2023). There is a significant prevalence of this form of suicide in some countries.

To improve road safety for this group, the following factors could be taken into consideration if appropriate:

- Focus on the behaviour of both pedestrians and drivers outside urban areas to prevent on-road vehicle-pedestrian collisions.
- Anticipation of the areas of the road where pedestrians are most likely to be present and adjustment of the road infrastructure accordingly.
- More comprehensive training of and better information to drivers on how to react in the event of a breakdown or an emergency on these types of roads.
- Reduce pedestrians' exposure to risk by pedestrians spending as little time as possible on the road, being visible and walking in appropriate areas, where possible and relevant.
- Improvement of safety on stretches of major roads located in urban areas (section of road through villages), is a task that could be addressed by the relevant authorities in each case.
- Fitting pedestrian detection systems in vehicles to prevent collisions involving this group of people.
- Characterise on-road vehicle-pedestrian collisions in full detail in statistics to develop effective strategies in each scenario.

2. Road workers

An analysis is conducted of the profile of workers positioned on the carriageway performing any type of work, whether maintenance or other construction tasks, or those working in roles connected with driver assistance (tow trucks or emergency services) or traffic control (law enforcement agencies).

The road as a workplace encompasses a large number of professionals, ranging from operatives responsible for maintenance and repair to tow truck and roadside assistance drivers, including all the workers in charge of traffic safety or emergencies.

The maintenance and repair work undertaken across the various road networks in Europe is performed by professionals who face significant exposure to the risk of collisions.

There is a constant risk of collisions, which varies depending on the various scenarios and actors involved. As such, every situation must be analysed thoroughly to determine the measures needed to keep all workers safe when undertaking actions on roads of any kind.

The work performed by such staff is essential to guarantee road safety; repair, maintenance and signage improvement work makes a significant contribution to improving safety for all users.

Many factors are involved in collisions of this type, such as inappropriate speed, distraction, poor visibility and failure to obey signs. Meanwhile, the need to perform such work at times when there is no impact on traffic, such as night-time working, tends to heighten the situation of risk.

The main challenges addressed by the European studies include developing effective perimeter protection for work areas ([SAFELANE, An all-encompassing, intelligent safety and asset management system for highway maintenance](#)), applying artificial intelligence (AI) to create a virtual safety zone and alert workers in the event of danger ([ZIMASS Smart mobile awareness and safety system for workzone invasion](#)) and using collaborative robotics and modularisation to keep personnel safe in work areas ([INFRAROB Maintaining integrity, performance and safety of the road infrastructure through autonomous robotized solutions and modularization](#))

Constructive dialogue, the exchange of practices of interest and of knowledge play a fundamental role in this sphere, with the gathering of highways directors held in 2022, and [the subsequent report](#) published in June 2023, setting out the main problems faced by highway maintenance workers, and how the automotive industry could help to minimise them, as in the case of the development of automatic emergency braking.

The signposting of safety zones is vital in order to attract driver attention, but do they attract driver attention? This issue was researched (Vignali, y otros, 2019) the conclusion reached being that an analysis of parameters such as speed and visual focus of drivers in these areas indicated that behaviours were unsafe.

An analysis of signs indicated that panels with graphics are more effective at attracting drivers' attention (Huang, Bai, & Asce, 2018).

One important aspect of study covered the areas prior to road works, the narrowing or disappearance of lanes and driver behaviour, mainly with regard to crossing lanes. It is essential to introduce systems in which prior safe lane-crossing spaces are sought and drivers behave collaboratively to avoid sudden manoeuvres near roadworks areas (Ren, Xie, & Jiang, 2021).

Some studies focus on researching lane changing behaviour in areas where lanes merge at roadworks (Gan, Weng, Li, & Han, 2020) and evaluating the impact of V2V (vehicle to vehicle)

and V2I (vehicle to infrastructure) technology on-board the vehicle in a roadworks scenario (Abdulsattar, Mostafizi, Siam, & Wang, 2020).

Meanwhile, the in-depth study of protective measures, as in the case of modularised, visible and standardised barriers (Osman Atahan, Arslan, Ganster, & Edl, 2019) represents a major advance to protect road users and workers in roadwork areas.

Once a collision has occurred, the analysis of the injuries and their seriousness are referenced to aspects such as the day, time and place where the collision occurred, so as to establish conclusions (Wong, Arico, & Ravani, 2011), demonstrating that there is a correlation among these variables. Furthermore, driver speed in this area is influenced by the perceived real likelihood of injuring workers and even damaging their own vehicles (Kumar Debnath, Haworth, & Bkackman, 2021) If drivers have this perception, they will reduce their speed.

In general terms, for this group, the following factors could be taken into consideration if appropriate:

- Increase the understanding of both road users and workers of the safety problem at road works sites through information and awareness campaigns emphasizing the importance of paying attention and reducing speed when approaching road works sites.
- Improve signage, including both physical barriers and signs, to enhance their visibility and clarity, beyond all possible doubt, to alert drivers effectively so they can adapt their driving to this new situation on the road.
- Development of and rolling out technology such as pedestrian and vehicle detection systems.
- Provide comprehensive training for workers, with a particular focus on following all procedures, safety protocols and good practices.
- Research and characterize incidents relating to this group.

3. Urban areas: older people

Older people are a continuously expanding group in the European Union, with the percentage of those aged over 65 years increasing from 16% in 2002 to 21% in 2022 according to the European Union's [2023 Demography Report](#).

This growth is giving rise to a demographic transformation in the region, where many European countries are implementing policies and programmes to support older people, promote active and healthy ageing and boost social and economic participation for this section of the population, for all of which it is necessary to foster and ensure safe mobility.

According to the latest European Commission thematic report on seniors, in Europe over 1 in 4 people killed in road collisions and 1 in 2 pedestrians or cyclists killed in road collisions are aged 65 or over.

The report stresses that, as drivers, older people pose a greater risk to themselves than to others.

Lack of mobility can result in social isolation for this community and the implementation of public policies must take into consideration the fact that older people face safety challenges when they use public transport or drive due to issues of mobility, sight, hearing and shorter reaction times.

In terms of urban accessibility, many European cities continue to pose architectural barriers and deficiencies in public transport that make it difficult for older people to move around.

The notable initiatives covered by the European Road Safety Charter include a project from the Czech Republic ([Seniors Without Accidents](#)), which focuses on the transport safety of older people.

Within the European Union-funded initiatives focusing on this group, the project [SENIORS - Safety-enhancing innovations for older road users](#) provides tools to facilitate broader adoption of advanced pedestrian restraint and protection systems to improve the protection of older and obese vulnerable highway users.

Research connected with accessibility for older people aims to establish methodologies to create accessible towns and neighbourhoods (Gaglione, Gargiulo, & Zucaro, 2022). Other studies demonstrate that perception of the characteristics of the urban environment acts as a decisive factor in the health and well-being of an ageing population (Gardener & Lemes de Oliveira, 2020)

It has been shown that district population variables (density and total inhabitants) have a clear influence on pedestrian incident rates, along with centres of activity associated with senior mobility, followed by the rate of ageing and the length of the roadways in each district (Gálvez-Pérez, Guirgo, & Ortuño, 2021).

In rural areas, territorial indicators associated to pedestrian mobility such as the physical severance index are revealed as interesting new variables to be considered in future research (Casado-Sanz, Guirao, & Gálvez-Pérez, 2019).

As bicycle users, the provision of well-separated cycle paths should be considered a priority in urban planning initiatives aiming to stimulate transportation cycling among older adults (Van Cauwenberg, De Bourdeaudhuij, Clarys, De Gaus, & Deforche, 2019).

With regard to collision data analysis, it is important to include age, as well as speed of collision and seriousness of injury, as an additional parameter to be studied (Niebhur & Junge, 2017).

To improve road safety for this group, the following factors could be taken into consideration if appropriate:

- Establishing infrastructure that is friendly to all ages.
- Accessible public transport.
- Carry out awareness-raising programmes both for older people to improve their safety and for others to improve their attitudes and understanding of older people.
- Exploring the possibility of creating personalized transportation services.
- Developing applications and technology to facilitate senior mobility
- Fostering active participation.

4. Urban areas: people with reduced mobility

It is an ethical and social imperative to guarantee the mobility of this group, thereby promoting inclusion and equal opportunity within our societies.

People with disabilities or reduced mobility face additional challenges in their daily lives and, as occurs with the senior community, access to appropriate mobility plays a key role in their quality of life and participation in society. Accessible mobility has a positive impact on emotional and mental well-being for both groups of people.

It is important to recognise that accessible mobility is much more than the presence of appropriate infrastructure, such as ramps, lifts and wide adapted pavements. Policies and services must be in place to ensure equity and dignity for everybody, without regard to their physical abilities.

Europe is witnessing significant progress in terms of accessibility for people with reduced mobility. However, despite the regulations and laws requiring certain accessibility standards in public buildings and spaces, many European cities still have significant obstacles for people with reduced mobility.

Public transport is also a major challenge. Although some transportation systems are adapted for people with disabilities, not all cities offer comprehensive solutions to facilitate equal access. This places limits on the mobility and independence of people who rely on wheelchairs or have difficulty moving.

The initiatives covered by the European Road Safety Charter notably include a project in Bulgaria (Accessible City Environment District, Triaditza), which makes provision for different actions focused on young people to improve conditions for people with disability.

Among the projects financed with European funds, the [CITIES-4-PEOPLE](#) project aims to address some of the urban and peri-urban sustainable mobility challenges that are of common interest for cities in the EU. Meanwhile, technology such as advanced driver assistance systems, and the way they can help with inclusion for people with reduced mobility in terms of traffic, are analysed in the project [ADASANDME](#) - Adaptive ADAS to support incapacitated drivers mitigate effectively risks through tailor made hmi under automation

The inclusion of people with reduced mobility represents a major challenge, prompting numerous cases of good practice. In February 2023, ITDP (Transportation and Development Policy and World Enabled (The Victor Pineda Foundation) presented the document "[Access and Persons with disabilities in urban areas](#)" in order to promote the establishment of inclusive transport policies.

Although there are numerous local initiatives, emphasis should be placed throughout Europe on the national policies which are gradually extending across the capillary network of cities, such as the [Italian](#) initiative to promote and protect the rights of people with disability and their families.

The cities that have launched programmes to improve public transport accessibility notably include the cases reported in [Lyon](#), [Thessaloniki](#), [Athens](#), [Paris](#) and [Lasi](#).

Initiatives to improve accessibility with private vehicles, such as the project intended to guarantee parking spaces for this group in [San Sebastian](#), the provision of smart parking spaces for people with reduced mobility in [Valencia](#), and facilitated access to Low Emissions Zones in [Brussels](#).

Other measures reported are intended to improve pavements and accessibility for people in wheelchairs, such as in [Sofia](#). The creation of a specific application to improve the mobility of people with reduced mobility in [Ukraine](#), and those intended for the use of shared adapted bicycles in [Hasselt](#) and [Nafplio](#).

Studies on the scope of the current literature on this subject indicate that few high-quality studies on the issue are available (Schwartz, Buliung, Daniel, & Rothman, 2022), making it necessary to conduct further research to engender the establishment of measures to improve mobility for this group.

Studies have been conducted to assess the effectiveness of mobility devices and wheelchairs in general (Brandt, Kreiner, & Iwarsson, 2010) and in special cases such as people with multiple sclerosis (Finlayson, Peterson, & Asano, 2014).

Likewise, the analyses of the difficulties involved in moving around in different environments, especially public transport access areas (Stock, 2023), and the restrictions, both physical and design-related, found in getting from A to B (Harada & Waitt, 2022), demonstrate that there is still a long way to go to improve mobility for people with reduced mobility (Henje, Stenberg, Lundälv, & Carlsoon, 2021).

The research also shows the need for greater scrutiny of collisions involving people using reduced mobility devices (Carlsoon & Lundälv, 2019).

In general terms, for this group, the following factors could be taken into consideration if appropriate:

- Fine-tune data gathering and analysis in connection with collision rates among this group, which will serve to better understand the circumstances of collisions and develop more precise and effective prevention strategies.
- Promote the construction and adaptation of road infrastructure, to ensure accessibility for people with reduced mobility.
- Awareness-raising campaigns and training programmes conducted not only for people with reduced mobility, but also society at large.
- Improvements to inclusive public transport, addressing the needs of all, irrespective of their mobility.
- Foster the development of applications and technological devices to facilitate their mobility, access to information and participation in society.

- Adoption of a comprehensive approach to the needs of people with reduced mobility by collaboration among different sectors, such as public, private and non-governmental organizations, together with coordination among different administrations.

5. Urban areas: personal mobility devices

Personal mobility devices have become increasingly popular thanks to their practicality, low cost and mobility opportunities.

This situation has led to a number of changes in urban mobility, even in social habits, offering an alternative to traditional modes of transport, and helping to improving connectivity and last-mile transportation, allowing people to reach their destination faster and with greater flexibility.

On the other hand, however, challenges are emerging, relating primarily to safety, because the coexistence of pedestrians, cyclists, cars and personal light electric vehicles can give rise to situations of conflict and even danger. The lack of clear rules and regulations is a highly topical area of debate and many cities are implementing specific policies and strategies to efficiently integrate personal light electric vehicles in road infrastructure.

If there is one mobility-related element which has seen (and continues to see) exponential growth, then it is Personal mobility devices (PMD), and specifically e-scooters.

Both shared bicycles and scooters have emerged as a sustainable and efficient alternative to traditional transport. These systems have gained popularity in numerous European cities. Such services allow users to rent a PMD via a mobile app, to be used to get around the city.

However, their rapid growth raises a series of challenges, some of which require urgent attention, above all as regards safety and regulations.

This is therefore an area with numerous initiatives, research studies and projects in progress. Since collisions are occurring, according to [the most recent specific report by the European Commission on Personal mobility devices](#), the majority of serious victims (more than 80% of e-scooter user deaths and 50% of traumatic injuries) are the result of collisions involving a heavier motor vehicle.

Head injuries are common, with just 4% of e-scooter users wearing a helmet when they were involved in a collision.

Among the initiatives recounted in the European Charter, the report [First-of-its-kind incident data involving shared e-scooters](#) aims to provide information from the perspective of the shared mobility rental operators as to road safety policies intended to reduce the risks of incidents for vulnerable road users, such as e-scooter users, cyclists and pedestrians, in partnership with the EU and local authorities.

Other notable actions include the campaign [Preventing drink-driving among young e-scooter drivers - tier “anti-drink-riding” app](#) comprising an application which aims to prevent alcohol consumption and scooter riding through the use of alternative vehicles, as well as [Practical training in the safe use of electric scooters, skateboards and Personal mobility devices](#).

In April 2023, the Road Safety Agency of Slovenia and Zavod VOZIM, the national coordinator of the European Road Safety Charter, staged the international conference [“The Future of E-scooters in Slovenia”](#).

Particular mention should be made of the project [DREEM - Designing user centric e-kickscooters & business models for enhancing intermodality](#), financed with European funds with the aim of designing and testing a modular e-kickscooter (e-KS) that would be safer for personal urban and suburban mobility.

Many organisations have published guidelines on how to incorporate personal mobility devices safely into the mobility mix, especially in cities. For instance, [one of the topic guides on Sustainable Urban Mobility Plans is on the subject of the safe use of micromobility](#).

Road safety NGOs such as the ETSC (European Transport Safety Council) have established a series of [recommendations to improve safety in connection with this type of vehicle](#), which emphasises the need for further research and data so as to understand the quantity, types and mechanisms of the injuries that occur, and to improve our understanding of the mechanisms of head and face injuries.

In September 2020, FERSI launched the report [E-Scooters in Europe: legal status, usage and safety](#) indicating the legal status, use and safety of e-scooters in 18 European countries. The report highlighted differences in aspects such as the legal status of such vehicles, road usage, speed limit, mandatory helmet use and other aspects.

This is a reality which goes far beyond European boundaries - the GHSA (Governance Highway Safety Association) in 2022 published [Understanding and tackling micromobility: transportation's new disruptor](#), indicating the concerns which exist at the global level in terms of safety, infrastructure, regulatory problems and the role played by shared vehicle companies on the micromobility market.

However, there are already successful micromobility initiatives which have been launched in European cities and could provide guidance for implementation in other cities: [Macro managing micro mobility - taking the long view on short trips](#), while other initiatives beyond the scope of Europe are presented in the [Safe Micromobility](#) Report produced by the ITF (International Transport Forum)

Regarding research studies in this area, an overview of the topics studied reveals the rapid evolution of this form of mobility.

The studies found in the previous decade aimed to research user satisfaction with the characteristics of e-scooters, frequency of use and factors predicting daily scooter use (Sund & Brandt, 2018) or the general appraisal of e-scooter users (Hardt & Bagenberger, 2019).

At the start of this decade, we began to see studies intended to research the challenges associated with the introduction of e-scooters within cities (Gössling, 2020), and initial analyses of collisions and their association with risk behaviours (Gioldasis, Chistoforou, & Seidowski, 2021)

The increase in collisions and injuries has given rise to studies intended to analyse the injuries occurring, focused mainly on head injuries (Serra, Fernandes, Noronha, & Alves de Sousa, 2021) and orthopaedic injuries (Hourston, Ngu, Hopkinson-Woolley, & Stöhr, 2021), as well as those suffered by children (Morgan, y otros, 2022).

Studying and minimising impacts on the head has become a priority, the aim being to characterise the biomechanics of the head-ground impact and to evaluate the protection offered by cycling helmets in typical falls from e-scooters (Wei, Petit, Arnoux, & Bailly, 2023). with specific neuro-surgical research being recommended for future research projects (Rashed, Vassiliou, & Barber, 2022).

Lastly, studies are undertaken with a focus on speed limits in accordance with usage zones (Caggiani, Camporeale, Di Bari, & Ottomanelli, 2022) and the effects of e-scooter and pedestrian coexistence (Sucha, Drimlová, & Recka, 2023).

The suggested needs regarding this group could be as followed if appropriated:

- Establish clear and updated regulations for PMD travel on public roads, guaranteeing the safety of PMD users and other road users.
- Pursue solutions with regard to infrastructure, integration with public transport and coexistence with other vehicles, allowing the integration of this type of vehicle.
- Education and awareness-raising campaigns conducted to inform PMD users about traffic rules, safety, and respect for other road users.
- Ensure that PMDs are accessible to all, including persons with reduced mobility, through the design and adaptation of accessible models.
- Implement control and inspection systems that guarantee compliance with the existing regulations, and promote responsible use of PMDs.

ANNEX 2. SHEETS OF
BEST PRACTICES
PROPOSED IN
EUROPEAN COUNTRIES

01/02/2024

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1. PEDESTRIANS ON ROADS

1.1. NEW HAZARD WARNING DEVICE (V-16 SIGNALS)

Spain

Regulatory approval has been given to a new warning device alerting drivers to the hazard of a vehicle that has become immobilised on the road. Use of the device will be mandatory from 1 January 2026. The device consists of a light, which will replace the warning triangles that are currently used, and it can be put in place without the driver having to leave the vehicle, thereby preventing the risks that arise from walking along the road. Moreover, this new device will be connected to the National Access Point for Traffic and Mobility.

OBJECTIVES

- Improve the safety conditions for the drivers of vehicles that have become immobilised (due to a breakdown or an accident) by eliminating the need to leave the vehicle in order to indicate its location.
- Reduce the post-accident response time and thereby reduce the risk exposure time for the affected vehicle and its occupants, as well as the time required to provide medical assistance to any injured persons.

DESCRIPTION

The current V-16 hazard warning device, as stipulated in Annex XI of the General Vehicle Regulation, consists of two triangles that the driver must place in front of and behind the vehicle that has become immobilised (whether due to a breakdown or an accident). To do this, the driver must walk along the road, which carries a certain risk.

Royal Decree 159/2021 of 16 March, regulating assistance services on public roads, was published on 17 March 2021. Final Provision 2 of this Decree modifies the V-16 signal specified in Annex XI of the General Vehicle Regulation, replacing the current triangle-based system with a new device consisting of a yellow light that must be placed as high as possible on the immobilised vehicle. Use of this new device will be mandatory from 1 January 2026 onwards.

As drivers do not need to leave the vehicle in order to put the device in place, the risks that arise from walking along the road are eliminated. Moreover, the device will be visible from a distance of 1000 metres, as opposed to the 100 metres that are currently stipulated, and its visibility is ensured under all conditions, including bad weather.

Additionally, when the new device is placed onto the vehicle it will automatically emit a signal communicating its activation, deactivation and geolocation to the National Access Point for Traffic and Mobility. This will make it possible to alert the necessary assistance services more swiftly, and to warn other road users of the hazard via the means available in each case.

In this latter respect, Royal Decree 159/2021 also provides for the new V-27 signal, which consists of a “virtual triangle” that is activated in the on-board systems of the vehicles that are in transit near the immobilised vehicle, in order to warn them of the hazard. The inclusion of this signal will be voluntary, and it will only apply to vehicles that are electronically connected to the National Access Point (DGT 3.0 platform).

The protocol and format for sending data from V-16 signals to the National Access Point were defined in the Decision issued on 30 November 2021 by the Directorate-General for Traffic (DGT), which was published in the Official State Gazette (BOE) on 10 December 2021. For its part, Written Directive MOV 2022/03 issued by the DGT's General Subdirector for Technology and Mobility Management clarifies the processes that will ensure the V-16 signals comply with the regulations regarding their physical, lighting and connectivity-related characteristics, with a view to providing guidance for the manufacturers of call-centre equipment and technical services related to type approval.

Lastly, as a transitional measure before the use of V-16 signals becomes mandatory on 1 January 2026, the DGT has published Instruction MOV 2023/15, which entered into force on 1 July 2023 and establishes an exemption from the obligation to use hazard warning triangles in the event that a vehicle becomes immobilised on a motorway or dual carriageway due to an accident or a breakdown. In practice, this exemption means that drivers will not be reported for failing to use hazard warning triangles (even if they have them) on motorways or dual carriageways in the event that their vehicle becomes immobilised due to an accident or a breakdown.

The Instruction justifies this exemption as follows: due to the high levels of traffic density and speed on motorways and dual carriageways where walking on the road is prohibited, it also makes sense to impose maximum restrictions on the movement of pedestrians even in emergencies, when it would not be possible to place hazard warning triangles on the road without seriously compromising the safety of the people who would have to walk along the road in order to put them in place.

EFFECTIVENESS

Between 2018 and 2020, 42 people died on interurban roads after leaving their vehicles. It is hoped that the new V-16 signal, which can be put in place without having to leave the vehicle, will help to reduce this figure substantially.

EXAMPLES OF APPLICATION

- DGT magazine: "Goodbye to the triangle":
<https://revista.dgt.es/es/reportajes/2021/03MARZO/0317-SenalV16.shtml>

REFERENCES

- Royal Decree 159/2021 of 16 March regulating assistance services on public roads:
<https://www.boe.es/eli/es/rd/2021/03/16/159>
- General Vehicle Regulation, Annex XI: <https://www.boe.es/buscar/act.php?id=BOE-A-1999-1826&p=20210414&tn=1#anxi>
- DGT Decision of 30 November 2021 defining the protocol and format for sending data from V-16 signals to the National Access Point:
[https://www.boe.es/eli/es/res/2021/11/30/\(4\)](https://www.boe.es/eli/es/res/2021/11/30/(4))
- DGT Written Directive MOV 2022/03: https://www.dgt.es/export/sites/web-DGT/.galleries/downloads/muevete-con-seguridad/normas-de-traffic/MOV-gestion-traffic/Escrito-Directriz_MOV-2022-03_Proceso-para-la-certificacion-de-senales-V16-conectadas-a-DGT-3.0.pdf.xsig.pdf
- DGT Instruction MOV 2023/15: https://www.dgt.es/export/sites/web-DGT/.galleries/downloads/muevete-con-seguridad/normas-de-traffic/MOV-gestion-traffic/2023/report_Instruccion-MOV-2023-15.pdf

1.2. PEDESTRIAN SAFETY - COMMON RESPONSIBILITY

Poland

The Małopolska Voivodship Police Headquarters in Cracow undertook a detailed assessment of the illumination of and road markings at pedestrian crossings for the whole region. The study identified a large number of deficiencies, especially related to illumination. The official statistics confirmed the high risk for pedestrians on pedestrian crossings.

OBJECTIVES

Improving pedestrian safety by lighting pedestrian crossings.

DESCRIPTION

Recognizing that pedestrians are at most risk at pedestrian crossings, the Polish region of Małopolska made a detailed analysis of all pedestrian crossings in the region, verified them, illuminated crossings and improved road markings. In addition, speed limits were reduced to 50km/h at pedestrian crossings across the regions on regional and national roads. Additionally, the cities implemented 30 km/h zones. The changes in infrastructure were connected to the long term awareness campaigns aimed at pedestrians and drivers, as well as improvement of the post-crash response system in the region

EFFECTIVENESS

- 322 illuminated pedestrian crossings on all types of roads.
- Raise of awareness regarding pedestrians and vulnerable road user safety.
- Improvement of the safety of pedestrians in whole region of Malopolska on pedestrian crossings:
 - 2016: 18 fatalities, 485 crashes.
 - 2019: 12 fatalities and 328 crashes.
 - 2022: 8 fatalities and 234 crashes.

EXAMPLES OF APPLICATION

- [Archiwum Projekty - Małopolska Wojewódzka Rada Bezpieczeństwa Ruchu Drogowego \(brd.malopolska.pl\)](http://brd.malopolska.pl)

REFERENCES

- <https://www.brd.malopolska.pl/>

1.3. LUMINESCENT ROAD MARKINGS

Belgium

Roads without lighting pose an increased risk to pedestrians and cyclists because they are less visible to drivers. Luminescent road markings were developed to solve this problem by providing improved visibility, even in the dark.

OBJECTIVES

Luminescent road markings offer an innovative solution to improve the safety of pedestrians and cyclists on unlit roads, helping to create a safer road environment for all road users.

DESCRIPTION

Pedestrian and cyclist safety: Pedestrians and cyclists are particularly vulnerable, especially in unlit areas. Luminescent road markings help clear demarcation of safe areas for pedestrians and cyclists, helping them navigate safely on these lanes.

Accident reduction: Accidents involving pedestrians and cyclists are unfortunately frequent. By improving drivers' visibility and understanding of pedestrians and cyclists, luminescent road markings help reduce accidents and save lives.

Driver awareness: Luminescent road markings also serve to educate drivers about the presence of pedestrians and cyclists, encouraging them to be more careful and attentive in unlit areas.

EFFECTIVENESS

Activities related to luminescent road markings have had a significant effect in improving visibility, enhancing safety, paving the way for a more widespread use of this solution to ensure the safety of road users.

EXAMPLES OF APPLICATION

Information not available.

REFERENCES

- https://infrastructures.wallonie.be/news/un-marquage-luminescent-teste-par-la-wallonie-pour-les-portions-non-ec?fbclid=IwAR2Wf9V-WP_RG1ggJRJOayF7bKjCRWHerQY9fmTjOBPdtIqTC7FPn_5fo0

1.4. SAFE-UP PROJECT

Spain

Since 2020, the SAFE-UP Project has been developing and testing active and passive safety systems and tools for future autonomous vehicles - to reduce injuries and fatalities in traffic accidents and contribute to the EU's Vision Zero.

OBJECTIVES

To empower participants with the knowledge required to navigate and mitigate potential risks in future traffic scenarios effectively.

DESCRIPTION

The platform has been designed to raise awareness among all individuals interested in the SAFE-UP project and its outcomes, regardless of their technical expertise.

Leveraging the expertise of the project's team, the eLearning courses offer a wealth of knowledge translated into easily digestible content, ensuring that users can navigate the intricacies of future traffic scenarios seamlessly. The platform is a product of tireless efforts in knowledge translation carried out within the project.

The e-Learning Platform comprehensively covers the extensive work undertaken within SAFE-UP and currently includes four distinct courses:

- Driver and pedestrian safety on the road
- Driver and bicyclist safety on the road
- Automated vehicles today and in the future
- Getting to know the SAFE-UP demos

EFFECTIVENESS

Information not available

EXAMPLES OF APPLICATION

- <https://www.safe-up.eu/e-learning>

REFERENCES

- [SAFE-UP: A shared vision to tackle shared road safety issues](#)
- [SAFE-UP project drives key research for Euro NCAP's future vehicle safety assessment](#)
- [Knowledge Translation for road safety innovation - SAFE-UP workshop summary](#)
- [Digital Twins predict future Autonomous Vehicle crash scenarios](#)
- [Current Safety-Critical Scenarios for Car-to-Pedestrian crashes in the EU](#)
- [Current Safety-Critical Scenarios for Car-to-Cyclist crashes in the EU](#)
- [The most common crash scenarios involving small & large motorcycles](#)

1.5. GEOLOCATION OF ACCIDENTS

Spain

The Directorate-General for Traffic (DGT), in collaboration with various police forces that are responsible for traffic surveillance and collecting accident data, is developing a graphic tool to enable visualisation of the geolocation of the accidents recorded and their corresponding data.

The aim is to improve the use of said data by providing a faster and more effective way to identify accident blackspots, and therefore the actions that need to be taken in each case to lower the accident rate.

With particular regard to the case studies that are the focus of this report, said tools may be helpful in the following use cases:

- Vehicle-pedestrian collisions on interurban roads.
- Accidents suffered by the elderly or people with reduced mobility on urban roads.

OBJECTIVES

Facilitate the use of accident data to improve road safety.

DESCRIPTION

DGT, as part of the process of improving the management of the traffic accident information system and the quality of the data recorded (representativeness, reliability, and reduction of the time needed to communicate the data and make it available), is developing a graphic tool to enable visualisation of the geolocation of the accidents recorded and their corresponding data.

The initiative is being developed in collaboration with the different police bodies that are responsible for traffic surveillance and collecting and communicating accident data.

The tool makes it possible to present and use data on [text cut off]. It is an online tool (currently only available internally at the DGT) that consists of two reports:

- A map showing the location of the accidents recorded in the system, with corresponding victim data (deaths within 24 h, hospitalisations due to injury within 24 h, and injuries not requiring hospitalisation within 24 h). The data can be filtered by municipality and year.
- A statistical report with a graphical representation of the data recorded, which can be filtered by municipality, year and indicator.

The tool is currently at the pilot stage and is available to the police forces who are collaborating with the project, so that they can trial the tool and provide the DGT with comments and suggestions for any modifications or improvements (e.g. data represented, filters, formats, etc.).

The ultimate aim is to create a helpful tool that allows data to be used to improve road safety, particularly for end users, i.e. police forces and those in charge of managing road safety.

Consequently, once it is in operation, the tool will be made available to any other police force that is responsible for traffic surveillance and wishes to use it.

EFFECTIVENESS

Information not available.

EXAMPLES OF APPLICATION

Once the system is in operation, and with regard to the case studies that are the focus of this report, this tool may be helpful in the following use cases:

- Vehicle-pedestrian collisions on interurban roads.
- Accidents suffered by the elderly or people with reduced mobility on urban roads.

REFERENCES

Information not available.

1.6. ADAPTATION OF ROADS IN AREAS NEAR PEDESTRIAN CROSSINGS

Spain

To make mobility activities safer for vulnerable users, particularly in the case of the elderly and users of personal mobility vehicles, it is vital that the layout of urban roads around pedestrian crossings be adapted, especially when there are no traffic lights, so that these areas enable such users to coexist with the presence of motor vehicles.

This adaptation has two particularly relevant aspects: one, reducing the speed at which the motor vehicles are driven; and two, improving visibility for both pedestrians and drivers.

OBJECTIVES

- Reduce the speed of traffic on roads near pedestrian crossings.
- Improve visibility for both pedestrians and drivers at pedestrian crossings.

DESCRIPTION

In order to improve the coexistence of motor vehicles and vulnerable users, it is vital that the speed of traffic on roads near pedestrian crossings be reduced. In order to achieve this, a number of actions are recommended:

- Move the stop line for the pedestrian crossing further back, in order to create a safety margin between the stop line and the crossing;
- Prohibit lane changing in areas near crossings, in order to increase the drivers' focus on the crossing;
- Reduce the size of the road at pedestrian crossings, creating (where applicable) central reservations.
- If the crossing has traffic lights, these must be programmed so that pedestrians can cross the road in a single stage, taking into account the crossing time required by the elderly and users of vehicles for people with reduced mobility.

The solution includes moving the stop line for the pedestrian crossing back by between 1 and 5 metres, combined with reducing the size of the road near the crossing by making it narrower and moving the pavement forward, thus creating a protective central reservation. For roads with more than one lane in each direction, the solution will include painting a solid line along the 25 metres before the zebra crossing, thereby preventing lane changing.

In addition, to improve visibility for both pedestrians and drivers at these blackspots, it is advisable to remove street furniture and parking spaces for vehicles with four or more wheels in (at least) the six metres before the pedestrian crossing in the direction of traffic flow.

It is also advisable to extend this measure to include vehicle entrances for properties and garages, as well as blind corners, in order to increase safety when vehicles are merging with traffic or turning.

The objective can be achieved in a variety of ways: through road markings or beaconing (zebra stripes, yellow lines, separators, beacons, bollards, etc.); by extending the pavements (kerb extensions and build-outs, prefabricated elements, etc.); or by adding parking spaces for two-wheeled vehicles (bicycles or motorcycles) positioned at least one metre from the pedestrian crossing.

EFFECTIVENESS

Information not available.

EXAMPLES OF APPLICATION

- Safer mobility on foot in Talavera de la Reina (Toledo):
https://www.dgt.es/export/sites/web-DGT/.galleries/downloads/conoce_la_dgt/que-hacemos/estrategias-y-planos/Experiencias-urbanas/pdf/83300-Talavera.pdf
- Traffic calming and speed moderation in Zaragoza:
https://www.dgt.es/.galleries/downloads/conoce_la_dgt/que-hacemos/estrategias-y-planos/Experiencias-urbanas/pdf/666900-Zaragoza.pdf

REFERENCES

- Recommendations for Safe and Sustainable Urban Mobility (DGT). Files 1, 2, 4 and 14:
https://www.dgt.es/export/sites/web-DGT/.galleries/downloads/conoce_la_dgt/que-hacemos/conocimiento-e-investigacion/12_Recomendaciones-de-Movilidad-Urbana-Segura-y-Sostenible-DGT.PDF
- Instruction for the design of public roads, File 5.5 (Madrid City Council):
<https://www.madrid.es/portales/munimadrid/es/Inicio/Vivienda-urbanismo-y-obras/Publicaciones/Instruccion-para-el-Diseño-de-la-Via-Publica/?vgnextfmt=default&vgnextoid=ebbdac0c317cf110VgnVCM2000000c205a0aRCD&vgnnextchannel=cf6031d3b28fe410VgnVCM1000000b205>
- Effectiveness of Road Safety Engineering Treatments, 2012 (Austroads):
<https://austroads.com.au/publications/road-safety/ap-r422-12>
- Road Safety Toolkit, Safer Road Treatments, Intersection - Signalise (iRAP):
<https://toolkit.irap.org/safer-road-treatments/intersection-signalise/>

1.7. PEDESTRIANS – MASTERPLAN WALKING 2030

Austria

The safety of pedestrians and more general of active mobility is an important topic within the Austrian Road Safety Strategy 2021 – 2030, where active, safe and climate-friendly mobility is forced. The maintainer of the Austrian motorways and motor highways (ASFINAG) focuses with highest priority on pedestrians, when planning rest areas. Speed is limited in shared areas with pedestrians, paths are separated, and routes specified etc.

The Austrian RVS guidelines for motorways usually intend lanes for mechanical breakdowns, which is also an important safety measure. Via different channels (i.e. radio) road safety information is provided. So drivers get a warning in case that there is a pedestrian on the driving route. RSS 2021 – 2030: Indicator Post Crash Care – Time elapsed in minutes and seconds between the emergency call following a collision.

OBJECTIVES

Improving road safety for pedestrians on the roads

DESCRIPTION

With the Masterplan for Walking 2015 for the first time a strategic frame was created to support pedestrian traffic in Austria. The Masterplan Walking 2030 develops this frame further and raises the significance of walking as levelled and equal form of mobility in the transport system. [Measures and strategies](#) at all political and planning levels are brought together to increase the share as well as the importance and safety as well as pleasure of this climate-neutral, resource-efficient and healthy mode of transport.

EXAMPLES OF APPLICATION

The BMK (Austrian Federal Ministry for Transport) offers part of the RVS (namely all connected with active mobility), which are normally to be bought, to interested parties for free. <https://www.klimaaktiv.at/mobilitaet/radfahren/rvs.html>

“BMK Masterplan for walking 2030” – Strategy for supporting walking in Austria as part of the implementation of the Mobility-Masterplan 2030

https://www.bmk.gv.at/themen/mobilitaet/fuss_radverkehr/publikationen/masterplangehen.html

The 4. Call for research projects, funded by the Austrian Road Safety Fund was focussing on the topic of walking. <https://www.bmk.gv.at/themen/verkehr/sTrasse/verkehrssicherheit/vsf/foerderungen/ausschreibungen/4ausschreibung.html>

The project “Rundum Sicht” examined possibilities to prevent accidents between pedestrians and trucks/busses more effective (Publication Nr. 77) , cf.

<https://www.bmk.gv.at/themen/verkehr/strasse/verkehrssicherheit/vsf/forschungsarbeiten.html>

1.8. SHADAR PROJECT

Austria

One sub-topic of the CEDR Call 2019 Safe Smart Highways was Preventing collisions with stopped vehicles in a live traffic lane.

Aim of the research was to reduce the risk of collisions with stopped vehicles by improving the detection, reporting and management of these high-risk events.

OBJECTIVES

Preventing collisions with stopped vehicles in a live traffic lane.

DESCRIPTION

The project “SHADAR” evaluated the current state-of-the-art and improvement of detection of stopped vehicles, the road user behaviour when confronted with a stopped vehicle in different positions, weather conditions and traffic situations and the process of discovery, warning, verification, firm response action, and communication.

REFERENCES

<https://www.cedr.eu/docs/view/6470cf8d9ad1b-en>

2. ROAD WORKERS

2.1. CONNECTED CONES

Spain

The Decision of 21 October 2022 regulates the protocol and format for the use of geolocated connected cones to send data to the National Access Point regarding the real-time location of sections of road where maintenance or repair works are being carried out.

OBJECTIVES

- Improve the safety conditions for operatives who are carrying out maintenance or repair works on the roads, as well as for those who are driving through the areas where the works are taking place.

DESCRIPTION

Further to the implementation of the European regulations regarding the introduction of Intelligent Transportation Systems (ITS) and the provision of real-time traffic information services throughout the European Union, the National Access Point (NAP) was created by means of the Directorate-General for Traffic's (DGT) Decision of 22 February 2021. According to this Decision, the DGT's General Subdirectorate for Technology and Mobility Management is responsible for informing users about the procedures they must follow in order to be able to access and exchange information with the NAP. Expanding the services and information provided via the NAP is the best way to eliminate road accidents and incidents arising from unforeseen events.

To this end, and in order to improve safety when roadworks is carried out, a voluntary service has been developed within the DGT 3.0 connected vehicle platform that enables the real-time receipt and publication of information related to the precise location of roadworks. The information is provided by connected cones that transmit their geolocation data.

This measure improves safety conditions not only for the operatives who are working on the road, but also for those who are driving through the area, as they will be able to receive the information through variable message signs placed on the road and through their own connected vehicles.

The service receives the signal from the cones that are laid out on the road, which in turn are directly connected to the DGT in accordance with the specifications described in the DGT Decision of 21 October 2022 defining the protocol and format for using connected cones to send data to the NAP regarding the location of sections of road where operatives are working.

There will also be situations in which roadworks or a road defect need to be marked even when there are no operatives working in the area. In such cases, the connected cones will warn drivers that they are approaching said area.

All of the information generated via this service will be shared with third parties, free of charge, through the NAP.

EFFECTIVENESS

Information not available.

EXAMPLES OF APPLICATION

- The Directorate-General for Traffic and the Directorate-General for Roads unveil connected cones for roadworks. Press release:
<https://www.dgt.es/comunicacion/notas-de-prensa/la-direccion-general-de-traffic-y-la-direccion-general-de-carreteras-presentan-los-conos-conectados-para-obras/>

REFERENCES

- DGT Decision of 22 February 2021 creating the National Access Point (NAP):
[https://www.boe.es/eli/es/res/2021/02/22/\(2\)](https://www.boe.es/eli/es/res/2021/02/22/(2))
- DGT Decision of 21 October 2022 defining the protocol and format for sending data to the National Access Point (NAP) via connected cones:
https://www.dgt.es/export/sites/web-DGT/.galleries/downloads/muevete-con-seguridad/normas-de-traffic/MOV-gestion-traffic/2022/20221021_Resolucionconosconectados_fe.pdf

2.2. REGULATION OF ASSISTANCE SERVICES ON PUBLIC ROADS

Spain

Royal Decree 159/2021 regulates the conditions under which the assistance services that attend the scene of an accident or a breakdown should perform their functions, the driving conditions for the assistance vehicles, and their equipment and signalling.

OBJECTIVES

- Improve the safety conditions for operatives who provide assistance on public roads to vehicles that have suffered an accident or a breakdown, as well as for those being assisted.

DESCRIPTION

Swift and appropriate action by the services that provide assistance on public roads to vehicles that can no longer be driven due to an accident or a breakdown is an important aspect of road safety. Removing obstacles from the road enables traffic to flow freely and ensures safe and sustainable mobility. Currently, the Vehicle Register contains details of more than 3000 owners who together have 11,000 vehicles that are used to provide assistance services. The provision of assistance services on public roads involves numerous activities that are carried out on a daily basis and present hazards for both the operatives in question and other road users.

Royal Decree 159/2021 of 16 March (subsequently complemented and amended by Royal Decree 1030/2022 of 20 December) establishes the conditions under which the assistance services that attend the scene of an accident or a breakdown on public roads should perform their functions. The approval of this Decree has resulted in modifications to the General Vehicle Regulation and the General Road Traffic Regulation. The main new developments are as follows:

- Introduction of the obligation to electronically notify the National Access Point for Traffic and Mobility (DGT 3.0 platform) that a vehicle has become immobilised or been involved in an accident.
- Improved signalling is stipulated for assistance vehicles: specifically, the V-24 signal, which identifies them as an assistance vehicle. The V-2 signal consists of a yellow light accompanied by reflective plates with red and white stripes. The V-23 is a reflective signal that marks the entire outline of the vehicle, in order to make it more visible under conditions of low visibility.
- The regulations also stipulate the requirements and conditions that must be met by roadside assistance operatives and the professionals who are tasked with providing said assistance, as well as the minimum safety requirements that must be met during the provision of same.
- Stipulation of the criteria for removing vehicles and transferring them to the appropriate location.
- A National Register of Assistance Services on Public Roads (REAV) has been created under the DGT; only the assistance vehicles included on said register will be authorised to remove or transfer vehicles that have broken down or suffered an accident. The operatives will be given a registration number and provincial code.

As a general rule, roadside assistance services (repair or removal) must be provided in a way that is as safe as possible for all road users, never on the side that is adjacent to the flow of traffic, and operatives must electronically notify the competent road traffic authority of the

geolocation of the affected vehicle so that it can be published via the National Access Point for Traffic and Mobility.

If these instructions are followed, assistance vehicles will have right of way and can stop on the public road in order to perform the relevant actions. The operatives that are responsible for performing said actions must possess the required knowledge and use the personal protective equipment specified in the applicable sectoral regulations.

EFFECTIVENESS

Between 2015 and 2019, 60 operatives died while providing roadside assistance, 113 were hospitalised due to injury, and 769 suffered injuries not requiring hospitalisation. It is hoped that the new regulation will help to substantially reduce these figures.

EXAMPLES OF APPLICATION

Information not available.

REFERENCES

- Royal Decree 159/2021 of 16 March regulating assistance services on public roads:
<https://www.boe.es/eli/es/rd/2021/03/16/159>
- Royal Decree 1030/2022 of 20 December modifying Royal Decree 159/2021 of 16 March regulating assistance services on public roads:
<https://www.boe.es/eli/es/rd/2022/12/20/1030>

2.3. SAFETY OF ROAD WORKERS

The Slovak Republic

The number of accidents caused by the inattention of drivers who do not concentrate on driving is increasing. Road users become vulnerable at a time when they are making sure that highways and expressways are safe and that motorists can reach their destination in comfort. National motorway company together with other European highway companies are launching a safety campaign and want to draw the public's attention to the workers who contribute to highway safety. The initiator of the idea is ASECAP, a European association of toll road infrastructure operators comprising 18 member countries and 127 companies that employ more than 45,000 employees directly and 200,000 employees indirectly. #SheWorks!Care

OBJECTIVES

- To draw the attention of drivers with a campaign on road workers

DESCRIPTION

Campaign called “We work; you drive safely”



EXAMPLES OF APPLICATION

- Campaign spot available on YouTube: <https://www.youtube.com/watch?v=-6rfGxjWWGk>
- Facebook campaign posts of National Motorway Company and Green Vawe of Slovak Radio:
https://www.facebook.com/profile/100064344055865/search/?q=MY%20PRACUJE%20ME%20C%20VY%20JAZDITE%20BEZPE%4%8CNE&locale=sk_SK

2.4. SAFETY FOR ROAD WORKERS AND SAFETY AT ROAD WORKS

Denmark

The Danish road standards are constantly publishing guidelines and manuals for signing and marking at road works. The road standards are widely known and used by actors in the road sector in Denmark.

OBJECTIVES

The road standards for signing and marking at road works aim at reducing the risk of accidents and injuries in relation to road works, both for the road workers and for road users passing the work site.

DESCRIPTION

Several manuals and guidelines are published on the Road Standards web page, now also in English as some contractors are foreign. The manuals have comprehensive content with drawings of both stationary and moving road works.

EXAMPLES OF APPLICATION

- The Danish Road Directorate demands course attendance from contractors who wish to bid for a contract for road work. So does several municipalities.

REFERENCES

<https://www.vej-eu.dk/da/vejen-som-arbejdsplads/the-road-as-a-workplace-step-1-236039/>

2.5. THE ROAD AS A WORKPLACE – SAFETY COURSE FOR CONTRACTORS

Denmark

In order to raise the safety knowledge level for workers on road sites there has been developed a set of courses for road workers.

OBJECTIVES

- To raise awareness among road workers on how to reduce accident and injury risk at road work sites
- To give road authorities the possibility of setting higher standards for the safety in relation to road works by demanding course certification from the contractors who carry out road work on their roads.

DESCRIPTION

The course is divided into different levels depending on the level of responsibility of the road worker. The course is followed by a test.

EXAMPLES OF APPLICATION

- The manuals are used widely as reference documents for elaboration of layout for marking and signing at work sites.

REFERENCES

[https://vejregler.dk/Soeg?search=%7B%22v%22:2,%22f%22:%22o- rison%22,%22p%22:%22c:!\(\(c:!\(da:Effective,go:0\),\(da:Coming,go:2\)\),pk:status\),\(c:!\(da:Afm-22,go:1\)\),pk:EMNER\)\),fsn:SearchResultFields,page:1,rn:Liste,skip:0,snippets:lt,soo:\(descending:lt,fieldName:sort_effect\),take:15%22%7D](https://vejregler.dk/Soeg?search=%7B%22v%22:2,%22f%22:%22o- rison%22,%22p%22:%22c:!((c:!(da:Effective,go:0),(da:Coming,go:2)),pk:status),(c:!(da:Afm-22,go:1)),pk:EMNER)),fsn:SearchResultFields,page:1,rn:Liste,skip:0,snippets:lt,soo:(descending:lt,fieldName:sort_effect),take:15%22%7D)
en.Vejregler.dk - The Danish Road Directorate

3. OLDER PEOPLE

3.1. SENIORS WITHOUT ACCIDENTS

Czech Republic

Roads without lighting pose an increased risk to pedestrians and cyclists because they are less visible to by the end of 2015, the share of seniors in the total population of the Czech Republic was about 18%, by the end of 2021 it was already 21%, by 2030 it will be 24% and by 2050 a whole third. The share of seniors in the total number of accident victims is growing in the same trend. In 2011, it was 16%; in 2021, it was 26%. Similarly, the proportion of severely injured seniors has increased from 14 to 18% over the last ten years. In the future, it can be expected that the proportion of seniors in the total number of accident victims will continue to increase.

OBJECTIVES

- The main goal of the long-term educational program SAFETY OF SENIORS IN TRANSPORT is to familiarize our elderly citizens with how to safely navigate the roads.

DESCRIPTION

The basis of the campaign is staged lectures. In total, over 500 events were held during the first and second rounds with nearly 40,000 seniors attending in total. In addition, educational packages were distributed to municipalities with a population of more than 2,000, which were not visited by the lectures, totalling 630.

EFFECTIVENESS

The project was massively promoted on television, radio, press and social networks, starring popular Czech celebrities: actress Jaroslava Obermaierová and actor and singer Jiří Štědroň. The backbone of the project was a series of 504 "theatrical conferences" throughout the Czech Republic, attended by 37,208 seniors and the team covering 152.91 km.

EXAMPLES OF APPLICATION

- <https://road-safety-charter.ec.europa.eu/road-safety-in-action/good-practice/safety-seniors-transport>

REFERENCES

- [senior without accidents presentation en 2022 .pdf](#)
- [en award submission european road safety charter.pdf](#)

3.2. REFRESHER DRIVING LESSON FOR THE ELDERLY

Slovenia

Slovenia is a country with a lot of small and much dispersed settlements where public transport does not cover the needs of mobility.

2 million inhabitants have as many as 1.2 million cars. The proportion of older drivers (61+) is 28% and is growing. For elderly, the car is a source of autonomy, mobility and a building block of social inclusion. Drivers in this age group are the most common drivers of fatal accidents, most often in which they die themselves.

During their driving career, cars, infrastructure, road rules, driving dynamics have changed and new forms of mobility have developed.

OBJECTIVES

- Explaining and reviewing road safety knowledge.

DESCRIPTION

On the basis of a thorough analysis of a very specific target public and clear objectives, we have designed a communication network of activities. Together with our partners, we have developed a long-term, individualized, recognizable, measurable and free program for drivers that could become a model for collaborating with older drivers in Slovenia. In preparing our communication strategy and materials, we were constantly paying attention to the analysis of the fears and motives of older drivers in this area. The core part of the project was supported by a strong awareness-raising campaign that promoted dialogue and a number of materials for the renewal of driving knowledge.

EFFECTIVENESS

Information not available

EXAMPLES OF APPLICATION

- [Refresher driving lesson for the elderly | European Road Safety Charter \(europa.eu\)](#)

REFERENCES

- <https://vozimse.si/>
- <https://www.youtube.com/watch?v=aw9pdjika1s&t=12s>

3.3. SENIOR SELFTEST

Belgium

In Belgium, as in Europe and large parts of the Western world, life expectancy is ever increasing. While this "aging" is made possible by very comprehensive preventive or curative health care, this certainly does not eliminate all the cognitive or motor impairments associated with aging. In addition, older people are also becoming increasingly mobile, and more specifically, they are using their own vehicle or car up to a higher age.

OBJECTIVES

- Focus on the triggers for accident risk with senior drivers.
- Increasing awareness with senior drivers on the importance of psycho-cognitive factors and their own capacities in relation to accident risk, and therefor safe and comfortable driving.

DESCRIPTION

The Selftest (as a product) is an online tool, which can be used on laptop or PC (or other HMI with sufficiently large screens). The test consists of the following modules:

- A general information module: "What is this test?"
- Demographic information module: "who are you?"
- TIPI test (Ten Item Personality Measure, Gosling 2003)
- 5 independent psycho-cognitive test modules:
 - Reaction time without choice: measuring psycho-motoric processing and attention
 - Reaction time with choice: measuring more advance psycho-motoric processing and attention.
 - Perception/vision.
 - Memory reduction skills / anticipation skills.
 - A feedback module providing the user with results.

EFFECTIVENESS

Once the development of the Selftest within the CARA 2 project was finished, it was validated during several workshops. As a result, thereof, we have tested senior drivers on the awareness raising potential of the Selftest:

- On the familiarity with psycho-cognitive factors, prior to taking the Selftest:
 - 41% of seniors have heard about psycho-cognitive factors influencing safe driving, prior to taking the Selftest, but didn't realise how important they are;
 - 47% of seniors are not familiar at all with psycho-cognitive factors influencing safe driving, and therefor also are not familiar with the importance thereof;
 - 12% of seniors know about psycho-cognitive factors and the importance thereof for safe driving.
- On the impact of the Selftest (awareness):

- 94% of seniors indicate that their knowledge on the importance of psycho-cognitive factors for safe driving has significantly (82%) or moderately (12%) increased
- 6% of seniors indicate that their knowledge on the importance of psycho-cognitive factors for safe driving has not increased

Further validation focused on the relevance of the Selftest in relation to possible safety impacts:

- Psycho-cognitive skills:
 - 24% of seniors that have executed the Selftest score below their “peer average”. This would warrant further professional guidance/investigation and they have been encouraged to seek such assistance.
 - 41% of seniors that have executed the Selftest score around their “peer average”. They have been encouraged to exercise different aspects of their skillsets (i.e. memory exercises, reaction time exercises, etc.).
 - 35% of seniors that have executed the Selftest score above their “peer average”. Although this is a good (personal) result, they do receive encouragement to exercise different aspects of their skillsets.

EXAMPLES OF APPLICATION

- <https://self-test-platform.digitala.pl/en>

REFERENCES

- <https://www.F2S2.be>

3.4. “CITIES 30”

Spain

In May 2021 a legal reform entered into force in Spain that reduced the general speed limit from 50 to 30 km/h on urban roads with a single lane in each direction and 20 km/h for single-level roads. The aim of the reform was to lower the accident rate, particularly amongst vulnerable users (pedestrians, people with reduced mobility, cyclists, motorcyclists and moped riders). The effectiveness of this measure is backed by numerous international studies on the relationship between the severity of an injury and the vehicle’s speed when the accident occurred.

Moreover, this regulatory change was a response to the demands of Spanish municipalities, many of which had already decided to become “30 cities”. Consequently, Spain became the first country in the world to implement 30 km/h as the general speed limit for urban roads with a single lane in each direction (which account for 80% of the country’s roads).

OBJECTIVES

- Lower the accident rate in urban areas, particularly amongst vulnerable users.

DESCRIPTION

In urban areas, motor vehicles no longer take centre stage. Use of the road space is now shared, and motorcycles, bicycles, electrically assisted pedal cycles (EPACs), personal mobility vehicles (PMVs) and pedestrians are becoming increasingly more prominent. Consequently, the road safety and mobility policies drawn up by local administrations now have one main aim: to lower the accident rate in urban areas. For this reason, Spanish cities have been demanding changes to the general urban traffic regulations, so that they can develop new and more suitable urban models.

Numerous studies, as well as real-world experience, have shown that reducing speed has a direct impact on lowering the accident rate amongst vulnerable users, and that it does not have a negative effect on traffic flow:

- Regarding accidents, there is a direct relationship between the vehicle’s speed and the likelihood that the pedestrian who is hit will survive. The risk of dying after being hit by a vehicle is reduced by at least a factor of five if the vehicle in question is travelling at 30 km/h instead of 50 km/h.
- Regarding traffic flow, in urban journeys motor vehicles do not exceed the average speeds, which in urban centres are generally in excess of 20 km/h.

As a result of the above, Royal Decree 970/2020 modified Article 50 of the General Traffic Regulation, changing the general speed limit on urban roads to:

- 20 km/h for roads with a single-level road and pavement layout.
- 30 km/h for roads with a single lane in each direction.
- 50 km/h for roads with two or more lanes in each direction.

Moreover, this regulatory change was a response to the demands of Spanish municipalities. In fact, many municipalities had already reduced the speed limit for many of their roads to 30 km/h and had even made this the default speed limit for all of their roads, thus becoming “30 cities”. This is the case for cities such as Bilbao, Pontevedra, Madrid, Barcelona, Seville, Malaga, Benidorm, Soria and Cuenca, among others. The limit now applies to all Spanish cities.

Consequently, Spain has become the first country in the world to implement 30 km/h as the general speed limit for urban roads with a single lane in each direction (which account for 80% of the country's roads).

EFFECTIVENESS

- The risk of dying after being hit by a vehicle is reduced by at least a factor of five if the vehicle in question is travelling at 30 km/h instead of 50 km/h.
- From May 11, 2021 to December 31, 2022, a 16% decrease has been recorded in the number of people over 65 years of age who died on urban roads, compared to the period from May 11, 2018 to December 31, 2019.

EXAMPLES OF APPLICATION

- “30 for everyone in Bilbao”. The 30 km/h limit in urban areas: https://www.dgt.es/export/sites/web-DGT/.galleries/downloads/conoce_la_dgt/que-hacemos/estrategias-y-planos/Experiencias-urbanas/pdf/350000-Bilbao.pdf
- Pontevedra: Road safety integrated into the city-wide approach. The streets speak for themselves: https://www.dgt.es/export/sites/web-DGT/.galleries/downloads/conoce_la_dgt/que-hacemos/estrategias-y-planos/Experiencias-urbanas/pdf/84000-Pontevedra.pdf
- Seville: From the pedestrianisation strategy to the 20/30 city. The peaceful coexistence of mobility networks: https://www.dgt.es/.galleries/downloads/conoce_la_dgt/que-hacemos/estrategias-y-planos/Experiencias-urbanas/pdf/688700-Sevilla.pdf
- 15-minute Soria (Soria 2030). A city on its way to zero emissions: https://www.dgt.es/.galleries/downloads/conoce_la_dgt/que-hacemos/estrategias-y-planos/Experiencias-urbanas/pdf/40000-Soria.pdf
- Terrassa: new sustainable mobility bylaw. Regulation as a tool to support the Mobility Plan: https://www.dgt.es/.galleries/downloads/conoce_la_dgt/que-hacemos/estrategias-y-planos/Experiencias-urbanas/pdf/218500-Terrassa.pdf

REFERENCES

- Royal Decree 970/2020 of 10 November modifying the General Traffic Regulation and General Vehicle Regulation: <https://www.boe.es/eli/es/rd/2020/11/10/970>
- The European Union, the European Commission and the Transport Area of the Florence School of Regulation, 2020. *Conclusions of the Executive Seminar on Speed and Speed Management*. Available at: https://ec.europa.eu/transport/road_safety/conclusions-executive-seminar-speed-and-speed-management_en
- 30 cities, safe streets (DGT, 2021): https://www.dgt.es/export/sites/web-DGT/.galleries/imagenes/muevete-con-seguridad/tecnologia-e-innovacion-en-carretera/recomendaciones-en-entornos-interurbanos/Ciudades30_.pdf
- New speed limits for urban roads and streets (DGT and FEMP, 2021): https://www.dgt.es/comunicacion/notas-de-prensa/la-dgt-y-la-femp-presentan-el-manual-de-aplicacion-de-los-nuevos-limites-de-velocidad-en-vias-urbanas/?utm_medium=copy&utm_source=DGT&utm_campaign=web

3.5. ROAD SAFETY EDUCATION FOR THE ELDERLY AND PEOPLE WITH REDUCED MOBILITY

Spain

Everyone who takes part in mobility activities should be fully aware of the risks involved and act in accordance with the values of a safe and sustainable approach to mobility that is based on responsibility, respect for other road users, and awareness of and compliance with the regulations.

With particular regard to the elderly and people with reduced mobility, it is important that both they and other public road users are aware of their mobility habits and particular circumstances in relation to road safety.

Moreover, according to the projected evolution of the population pyramid, over the next few years there will be growing numbers of elderly people taking part in various forms of mobility activity, whether as pedestrians, drivers, cyclists or users of personal mobility vehicles (PMVs) or public transport.

OBJECTIVES

- Educate everyone who takes part in mobility activities on the risks and responsibilities associated with the particular mobility habits and road safety-related circumstances of the elderly and people with reduced mobility.

DESCRIPTION

Road safety education has always been viewed as a subject reserved for school: people are only taught about road safety when they are children and, at best, adults only come into contact with road safety education again when they obtain their driving licence and take lessons with a driving school.

However, this view has since changed, and road safety education is now considered a process that begins at the earliest possible age and continues throughout a person's life. The promotion of an active, healthy, safe and sustainable approach to mobility is a priority, especially for the youngest members of society; however, throughout our lives we all use transport and mobility in a variety of ways, which may change over the years or even within a single day or a single journey.

The aim is for citizens to be able to travel safely and without obstruction on public roads under any circumstances and conditions; not only as drivers, but also as pedestrians or users of any forms of public or private mobility.

Consequently, the actions designed to improve road safety education must be adapted to suit different ages, different forms of mobility and different groups of road users.

Moreover, road safety education is currently undergoing a paradigm shift, caused by the growing importance of active forms of mobility (especially cycling) and the emergence of new forms of mobility (PMVs). We must not overlook the important role played by these modes of transport in facilitating access to mobility for many people. However, this must be accompanied by educational provisions that enable the acquisition of basic skills and knowledge, as well as an awareness of the risks associated with modes of transport that are particularly vulnerable.

The Directorate-General for Traffic (DGT) provides materials and resources to help educate the elderly and people with reduced mobility on road safety, designed both for the users in question and the professionals who habitually work with them.

EFFECTIVENESS

Information not available.

EXAMPLES OF APPLICATION

- “Safe and active older people” (Zaragoza). Dossier for the first campaign: https://www.zaragoza.es/cont/paginas/noticias/dossiereducacionvial_mayoresactivos_yseguros_2019-2020.pdf
- “Safe and active older people” (Zaragoza). Presentation of the third campaign: <https://www.heraldo.es/noticias/aragon/2022/09/29/campana-mayores-activos-seguros-personas-edad-seguridad-vial-en-zaragoza-1602633.html>

REFERENCES

- Improved road safety for the elderly (DGT website): <https://www.dgt.es/conoce-la-dgt/que-hacemos/educacion-vial/educacion-vial-para-personas-mayores/>

3.6. SENIOR MOBILITY, SAFE MOBILITY

Spain

The Santalucía Group and the RACE Foundation are launching the "Senior mobility, safe mobility" campaign to raise awareness and educate the over-65s about the risks they may face as pedestrians. The campaign is aimed at 9.5 million Spaniards over the age of 65, 20% of the population which, according to projections by the National Statistics Institute (INE), is a group that will grow to 26.5% by 2035.

OBJECTIVES

- Workshops in different cities to raise awareness among the senior population of responsible mobility and make them protagonists by actively listening to their requests to improve mobility and road safety in their surroundings.

DESCRIPTION

Four thematic stations will be set up:

1. Voice of experience: workshop on active and passive vehicle safety systems, ergonomics and use of seat belts, child restraint systems (CRS), and transfer of minors.
2. Golden age: Practices and advice on healthy habits.
3. Senior Concern: An interactive place to collect requests and concerns on mobility and safety issues.
4. Awareness: Video with tips on good mobility, road safety and health practices.

EFFECTIVENESS

This initiative has directly reached almost 2,000 vulnerable users over 65 years of age, which aimed to raise awareness of the particularities of mobility and road safety for this group.

EXAMPLES OF APPLICATION

- <https://www.grupoaseguranza.com/noticias-de-seguros/santalucia-fundacion-race-lanzan-campana-para-concienciar-vial>

REFERENCES

- <https://www.eldiarioalerta.com/articulo/agencias/race-santalucia-acuerdan-fomento-seguridad-vial-movilidad-responsable/20210908195026266142.html>
- <https://www.santalucia.es/gabinete-de-prensa/santalucia-y-fundacion-race-lanzan-una-campana-de-movilidad-activa-para-seniors>

3.7. **IN-DEPTH ANALYSIS OF SERIOUS ACCIDENTS INVOLVING ELDERLY CAR DRIVERS**

Denmark

The Danish AIB (Accident Investigation Board) carries out theme based accident analysis of selected groups of serious accidents. Theme no 9 was about elderly car drivers.

OBJECTIVES

- The Danish AIB investigates serious accidents with the purpose to uncover the accident and injury factors that contributed to the accidents. The Board also presents possible measures that could have prevented the accidents.

DESCRIPTION

The Board presents the findings from 32 serious accidents with elderly drivers. Three categories of accidents could be distinguished:

- Accidents where the elderly driver was temporarily unconscious
- Accidents where the elderly driver failed to see other road user or a red light
- Accidents where the elderly driver didn't contribute to the accident.

REFERENCES

<https://www.hvu.dk/side/publikationer-1>

3.8. SAFETY OF OLDER PEOPLE AND PERSONS WITH REDUCED MOBILITY

Austria

The RSS 2021 - 2030 refers to the important measurement of a movement training (coordination, reaction, and balance training) for elderly pedestrians to prevent falls. Focus on the increasing number of accidents with pedelecs / E-Bikes with elder road users. Elder drivers cause disproportionately often crashes when driving a passenger car.

The Austrian Road Safety Strategy 2021 – 2030 in general keeps in mind to better respect the needs of road users with reduced mobility (meaning physical and mental limitations)

OBJECTIVES

The goal is to optimize safe mobility by offering advice. (Road Safety advice and Mobility advice as well as a voluntary test for checking the fitness to drive.

DESCRIPTION

4th call of the Austrian Road Safety Fund (walking and safe mobility – projects focusing on the elder generation).

<https://www.bmk.gv.at/themen/verkehr/strasse/verkehrssicherheit/vsf/foerderungen/ausschreibungen/4ausschreibung.htm>

This tender focused on improving pedestrian safety. The projects described were judged to be eligible for funding in the context of the call for proposals.

EXAMPLES OF APPLICATION

The Research project “Generation 65+” (publication Nr. 62)

<https://www.bmk.gv.at/themen/verkehr/strasse/verkehrssicherheit/vsf/forschungsarbeiten.html?page=2>

The project “Observe” evaluated crossing sites in urban areas by a risk-based valuation method.
<https://www.bmk.gv.at/themen/verkehr/strasse/verkehrssicherheit/vsf/foerderungen/ausschreibungen/4ausschreibung/observe.html>

VSF Publication Nr. 60 is focusing on the topic drive your bike safely when getting older
<https://www.bmk.gv.at/themen/verkehr/strasse/verkehrssicherheit/vsf/forschungsarbeiten.html?page=2>

4. REDUCED MOBILITY USERS

4.1. ACCESSIBLE CITY ENVIRONMENT DISTRICT TRIADITZA

Bulgaria

People with disabilities in Bulgaria are seriously isolated from social life in a city and this makes them feel unwanted by society. Small but right steps we can be the initiators of a value change not only in our city but throughout the country.

OBJECTIVES

- Spread success actions that other young people can learn and follow, promoting volunteering and solidarity.
- Make the urban environment a more cozy and accepting place for people who feel isolated.
- Create conditions for equal access of people with disabilities to services.
- Instil values such as solidarity in young people, increasing their social commitment in the city: each young person can change the environment in which they live if they are proactive and socially committed.
- Involve as many local residents of the area as possible with the issues of people with disabilities.

DESCRIPTION

The project was promoted at the level of social networks, online media, as well as through the channels of the regional administration, which was the main partner.

EFFECTIVENESS

More accessible central urban environment in Sofia for people with mobility difficulties, increased social activity and public engagement of young people in the city. Increased awareness of the citizens of Sofia about the problems and challenges facing people with disabilities and the accessible urban environment.

Changing the model by which the urban infrastructure on the territory of Sofia and in particular Triaditsa is being built and reconstructed.

EXAMPLES OF APPLICATION

- [youthpasses_scan.pdf](#)
- [brochures.pdf](#)

REFERENCES

Information not available.

4.2. ROAD SAFETY OF PEDESTRIANS WHO HAVE A DISABILITY - MICROMOBILITY

Ireland

Individuals who are blind or have low vision face unique challenges when it comes to navigating our roads. These challenges include not being able to access traditional signage and visual warning signals, not being able to make eye contact with drivers and other road users, veering on crossings or collision with obstacles due to an absence of visual information.

OBJECTIVES

There are over 58,000 individuals in Ireland that are blind or have a vision impairment and it is NCBI's mission to enable them to overcome the barriers that impede their independence and participation in society.

- NCBI responded to the increased safety concerns experienced by these individuals when navigating Irish roads and streets with a multi-dimensional and collaborative approach.
- Working in a solution focused way to minimise the impact on safety and confidence in individuals who have a disability.

DESCRIPTION

The NCBI conducted research and found that 63% of individuals with a vision impairment reported being injured in a public place at least once when navigating outdoors and 59% indicated increases in micro mobility and changes in public space reduced their confidence to walk and access the community. Research also highlighted that despite not having legislation for e-scooters in Ireland, 64.9% of individuals with a vision impairment had experienced a near miss with an E-Scooter on Irish roads.

EFFECTIVENESS

The effect has been widespread awareness of the challenges experienced by individuals with a vision impairment in Ireland, engaging stakeholders from across the disability sector, government bodies, academia, mobility & transport sector operators and of course individuals who have a disability. The focus of education has elsewhere been on the micromobility rider. This is the first time vulnerable pedestrians who have to move safely around them have been equipped with the knowledge they need to move confidently through the community.

EXAMPLES OF APPLICATION

Information not available.

REFERENCES

- [Go Safely- Micro Mobility E-Module for Vulnerable Pedestrians.docx](#)
- [Position Paper Feb 2022 \(002\).pdf](#)

4.3. UNOBSTRUCTED PATHS

Belgium

Obstacle-free footpaths, making thresholds visible to blind and visually impaired pedestrians by means of a campaign from the perspective of blind and visually impaired road users.

OBJECTIVES

- The highlight of the action took place during the Week of Mobility (16-22/09/2022). To shape the project, the organization went through a participatory process with blind and visually impaired volunteers: The Team Trottoir Brigade (a group of volunteers both with and without visual impairment). In order to encounter fewer obstacles on the footpath, we need to make people aware of the problem. The aim was to approach this in a positive way.

DESCRIPTION

Team Trottoir is a campaign which encourages both people with and without visual impairments to put obstacles in the spotlight. Symfoon wants to make road users and local authorities in their own environment aware of the importance of a free footpath to increase the safety of blind and visually impaired people. One of the most important challenges for people with visual impairments is mobility and road safety. Due to reduced vision or the lack of vision, a large part of the autonomy is limited and moving as a pedestrian is often the only option. That is why it is extremely important to encourage this only opportunity to move in the safest possible context. An accessible footpath is therefore first and foremost obstacle-free.

EFFECTIVENESS

People became aware of the problem. A lot of people sent us pictures of obstacles they identified. We received a lot of media attention and our campaign also came to the attention within politics.

EXAMPLES OF APPLICATION

Information not available.

REFERENCES

- https://road-safety-charter.ec.europa.eu/sites/default/files/good_practice/supporting_files/Aanbevelingen.pdf

4.4. IMPROVEMENT OF ACCESSIBILITY IN LYON

France

Public authorities, transport operators, civil society organisations and other public and private sector stakeholder in Greater Lyon have been successfully improving accessibility addressing it as a cross-cutting issue and investing substantially in creating a barrier-free and inclusive environment.

OBJECTIVES

- Promoting independent mobility.
- Improve the accessibility of public space and municipal institutions as well as the general accessibility of life in the city (for example, spaces of culture, education, employment and information).

DESCRIPTION

30 % of the people who use Lyon's public transport network are affected by mobility issues. This includes people with 'permanently reduced' mobility (wheelchair users, people with visual impairments and those who are deaf or hard-of-hearing, etc.) and 'temporarily reduced' mobility (pregnant women, and people with pushchairs, shopping or luggage, etc.).

The Programme has been developed by a Communal Accessibility Commission that consists of elected representatives from the city and its nine boroughs, and representatives from 62 civil society organisations and institutional partners. Besides mobility, the Programme targets the accessibility of public space and municipal institutions, and overall accessibility of life in the city (e.g. culture, education, employment and information).

EFFECTIVENESS

The public transport network is extensive, including four metro lines, two funicular lines, five tram lines, 1 000 buses and 6 555 stops. All of the vehicles used for public transport are equipped with a low floor, retractable ramps and wider entrance doors, while each has four seats reserved for people with reduced mobility.

All metro stations (except Croix-Paquet where the configuration does not allow its redevelopment) are now accessible. They are equipped with sound-system lifts and embossed buttons and braille to enable easy access for people with low or no vision, as well as people in wheelchairs. Seven out of 10 bus stops are equipped for people with reduced mobility. In delivering the 2016-2022 Programmed Accessibility Agenda, SYTRAL plans to ensure accessibility at 812 priority stops spread over the TCL network.

SYTRAL's policy in terms of passenger information benefits everyone by making it easier for people with reduced mobility to travel. The geo-localised dynamic passenger information system, deployed on 118 panels on the underground transport network and the funicular, provides users with waiting times to the next two trains in real time, as well as information on any delays and their anticipated resolution time. The passenger information system is also connected to the new overall traffic management system in the Lyon urban area that provides real transport data, allowing for a 10% reduction in congestion and guaranteeing travel time for 100%. A system that has been praised by EU Commissioner for Transport Violeta Bulc during her overview of Europe-wide notable achievements in urban mobility in 2018.

An innovative remote-control device can be used by visually impaired people to receive travel information from buses, at bus stops and at passenger information kiosks. It can also be used to automatically activate sound boxes at pedestrian crossings. Some 75 % of pedestrian crossings have been equipped with such sound devices.

SYSTRAL also organises and finances the Optibus and Optiguide services. Optibus provides dedicated transport services for people with disabilities, facilitating over 100 000 trips per year. Optiguide provides information on door-to-door travel options and individual guidance to enable people to travel independently by public transport. Furthermore, 2 500 public transport drivers have been trained to provide better services for people with disabilities.

The implementation of these actions is generally considered to have greatly improved accessibility for all within the entire metropolitan agglomeration of Lyon. In recognition of this achievement, Lyon not only received the Access City Award 2018 but was named European Capitals of Smart Tourism 2019 for exemplary achievements as a tourism destination in implementing innovative and intelligent solutions for accessibility, in addition to sustainability, digitalisation, cultural heritage and creativity.

EXAMPLES OF APPLICATION

- Fiche d'accessibilité pour la voirie: [4000001884323-0.pdf \(lyon.fr\)](#)

REFERENCES

- Metropole Lyon: SUMP: [Plan de Déplacements Urbains 2017-2030](#)
- Metropole Lyon: [Accessibility Master Plan for Roads and Public Spaces](#)
- SYTRAL: [Accessibility of public transport network and 2008 Accessibility Master Plan](#)
- City of Lyon: [Communal Commission on Accessibility](#)
- European [Access City Award](#)
- European Capital of Smart Tourism: https://ec.europa.eu/growth/content/helsinki-and-lyon-receive-european-capital-smart-tourism-awards_en

4.5. **THESSALONIKI _ AUDIO ANNOUNCEMENT SYSTEM AT BUS STOPS**

Greece

The local public transport service operator in the Greek city of Thessaloniki, OASTH, has introduced a new system of audio announcements at selected bus stops to assist individuals with visual impairments.

OBJECTIVES

- Promoting independent mobility.
- Improving accessibility to public transportation for people with visual impairments.

DESCRIPTION

By simply pressing a button at the bus stop, people can receive audio information about the arrival times of the bus lines passing through that particular location. This expansion of the audio announcement system was carried out in collaboration with the Panhellenic Association of the Blind - Regional Union of Central Macedonia and the Panhellenic Association of Paraplegics - Macedonia - Thrace Branch. According to OASTH's recent announcement, there are now 35 stops equipped with this feature.

To ensure that the audio announcements are audible amidst the ambient noise, the volume has been checked and adjusted accordingly. OASTH implemented this feature in compliance with the National Action Plan for the rights of Persons with Disabilities, demonstrating their commitment to supporting individuals with disabilities.

EFFECTIVENESS

Information not available.

EXAMPLES OF APPLICATION

- <https://www.economix.gr/2023/06/30/thessaloniki-trianta-pente-oi-staseis-tou-oasth-pou-milane-me-to-patima-enos-koubiou-kai-diefkolynoun-atoma-me-provlimata-orasis/>

REFERENCES

- <https://www.eltis.org/in-brief/news/thessaloniki-expands-audio-announcement-system-bus-stops>

4.6. ATHENS _ FULLY ACCESSIBLE METRO STATION

Greece

Undertaken on the initiative of the Superfund and Athens Transport and involved the participation of passengers with reduced mobility, the Monastiraki metro station, is the first fully accessible for people with reduced mobility (PRMs) in Greece.

OBJECTIVES

- Improve the accessibility of public transport infrastructure and improve passengers' travel experience, thus facilitating PRMs' daily life, making their journeys on public transport easier, and more attractive.

DESCRIPTION

The project was part of the initiative "TOGETHER EVERYWHERE we become accessible", under which the following actions have been planned:

Training and information: The provision of training for bus drivers and staff in metro stations, and the creation of accessible communication tools, which indicate the location of all metro lifts on Google Maps, to facilitate PRMs' access to metro stations.

Infrastructure: The completion of 2 accessible metro stations (Kallithea and Monastiraki), which includes an accessibility assessment by PRMs and the recording of detailed suggestions for improvement. In addition, 20 soft infrastructure measures will be implemented to improve the accessibility of public transport, along with a monitoring mechanism to report and verify progress, as well as the installation of 409 ramps at bus stops.

Monitoring of results & governance: The creation of an Accessibility Index as the main KPI to monitor the effectiveness of these actions, measuring the increase in the use of public transport by PRMs.

Help Desk: With the support of PRMs, a helpdesk will be set up to improve the accessibility of communication materials.

EFFECTIVENESS

Information not available.

EXAMPLES OF APPLICATION

- <https://www.economix.gr/2023/05/17/ypertameio-sygkoinonies-athinon-drasesis-gia-prosvasimotita-amea-me-1o-piloto-ton-stathmo-tou-metro-sto-monastiraki/>

REFERENCES

- <https://www.eltis.org/in-brief/news/athens-has-its-first-fully-accessible-metro-station>

4.7. PARIS ACCESSIBLE MOBILITY SOLUTION PLAN

France

Paris is set to host the Olympic and Paralympic Games in summer 2024. In preparation for the 350,000 disabled visitors expected, Ile-de-France Mobilités has created a plan to provide each individual with a disability with an accessible mobility solution.

OBJECTIVES

- On-demand public transport for people with reduced mobility will get simplified, cheaper (about EUR 2 per ticket) and increase in volume from 730,000 trips in 2019 to beyond a million in 2024.

DESCRIPTION

Additional capacity is required to Paris' existing Île-de-France bus network and Regional Express Network railway system.

Île-de-France Mobilités, which controls and coordinates the different companies operating in the region's public transport network, plans to operate a shuttle service between key stations in Paris and Olympic and Paralympic venues.

It hopes this will be able to transport at least 40 per cent of an estimated 4,000 wheelchair users attending each day of Paris 2024.

The French Government additionally wants a five-fold increase in the number of wheelchair-accessible taxis in Paris from 200 to 1,000, while organisers plan to make situate parking and drop-off areas for people with disabilities as close to competition venues as possible.

EFFECTIVENESS

Information not available.

EXAMPLES OF APPLICATION

Information not available.

REFERENCES

- <https://globeecho.com/sports/paris-2024-a-plan-to-facilitate-travel-for-people-with-disabilities/>
- <https://www.insidethegames.biz/articles/1133710/paris-2024-transport-plan-disabilities>
- <https://www.france24.com/en/france/20230828-obstacle-course-for-the-disabled-can-paris-transport-be-made-accessible-in-time-for-the-olympics>
- <https://www.eltis.org/in-brief/news/paris-facilitates-travel-people-disabilities-olympic-and-paralympic-games-2024>
- <https://www.ucopia.com/en/news-en/paris2024-transport-challenges/>

4.8. BRUSSELS_ ACCESSIBILITY LOW EMISSION ZONE

Belgium

The project involves introducing a new exemption for drivers with reduced mobility in Brussels' Low Emission Zone. The exemption allows individuals with mobility disabilities, who possess a special parking card for persons with disabilities and receive an increased contribution from the state for healthcare, to continue driving in Brussels without facing any sanctions.

OBJECTIVES

- To improve accessibility and mobility options for individuals with reduced mobility, promoting inclusivity and equal opportunities for transportation in Brussels.

DESCRIPTION

Drivers with reduced mobility are now exempt from the Low Emission Zone (LEZ) regulations in Brussels. The exemption was initiated by the Brussels Minister for Environment and Climate Transition and approved by the regional government. It allows individuals with mobility disabilities, who receive an increased contribution from the state for healthcare and possess a special parking card for persons with disabilities, to continue driving in Brussels without facing any sanctions. The new exemption aligns Brussels' LEZ legislation with that of Antwerp and aims to improve accessibility for people with reduced mobility. The PDF also mentions other existing exemptions in the LEZ and highlights the importance of such exemptions for individuals who heavily rely on cars as their primary means of transportation.

EFFECTIVENESS

Information not available.

EXAMPLES OF APPLICATION

Information not available.

REFERENCES

- <https://www.brusselstimes.com/news/belgium-all-news/157992/handicapped-people-with-reduced-mobility-can-request-exemption-from-brussels-low-emission-zone-lez-alain-maron>

4.9. IAȘI _ ACCESSIBLE MOBILITY SOLUTION PLAN

Romania

The Romanian city Iași teams up with APTA Iași, a local NGO promoting alternative transport, to improve access conditions for people with reduced mobility. The focus is placed on sidewalks and paths.

OBJECTIVES

- To improve street infrastructure's quality to comply with European standards concerning people needing extra assistance.

DESCRIPTION

The first projects of this year focus on public transport stations, audio signals for traffic lights and tactile pavements. Also the city hall has created a working group to continue improving public streets to suit everyone's needs under involvement of APTA.

EFFECTIVENESS

Information not available.

EXAMPLES OF APPLICATION

Information not available.

REFERENCES

- <https://www.themayor.eu/en/a/view/better-accessibility-to-public-infrastructure-for-disabled-people-in-ia-i-romania-7387>

4.10. ITALY _ MOBILITY SINGLE NATIONAL POINT

Italy

The Single National Point will carry out research and programming activities in order to plan and improve the future of mobility for people with disabilities and PRMs. In addition, it will organise seminars and training courses on mobility, driving, technological devices and legislation for the staff of the Local Medical Commissions, who are in charge of issuing and renewing special driving licenses, and for the staff of the peripheral offices of the MIMS' Department of Sustainable Mobility.

OBJECTIVES

- To promote the personal mobility of people with disabilities and those with reduced mobility (PRMs) in order to increase their autonomy and safety when travelling, as well as to facilitate their social and professional integration.

DESCRIPTION

The Single National Point for Accessible and Sustainable Mobility will facilitate the development of projects to ensure accessible mobility. For its part, the Territorial General Direction of the MIMS will ensure free access for those with mobility challenges to all services for the assessment and evaluation of driving skills that are necessary for obtaining or renewing their driving license.

Finally, the Single National Point aims to support people with disabilities and PRMs by establishing a technical framework common to and for all public and private bodies and institutions, car manufacturers, rehabilitation centres, driving schools and trade associations. This will help to implement the right to mobility through the provision of professional competences and simplified procedures (e.g., for Ministries, Driver & Vehicle Licensing Agencies) and in relation to the assessment and confirmation of the eligibility to drive, both for private and professional use.

EFFECTIVENESS

Information not available.

EXAMPLES OF APPLICATION

Information not available.

REFERENCES

- <https://www.eltis.org/in-brief/news/italy-establishes-single-national-point-support-travel-those-mobility-challenges>
- <https://www.canaleenergia.com/attualita/a-roma-nasce-il-primo-punto-unico-nazionale-per-la-mobilita-accessibile-e-sostenibile/#:~:text=Il%20Punto%20Unico%20per%20la%20Mobilit%C3%A0%20Accessibile%20e,con%20disabilit%C3%A0%20grave%20di%20natura%20motoria%20o%20neurologica>

4.11. **SOFIA _ SIDEWALK RENEWAL PROGRAMME**

Bulgaria

Over the next four years, more than 690,000 square metres will be renovated in an effort to improve walking conditions throughout Bulgaria's capital.

OBJECTIVES

- Large-scale programme for repair and construction of sidewalks.

DESCRIPTION

Years of underinvestment and poor maintenance have left sidewalks in a deplorable state in many areas in the city. Subsidence, extreme weather conditions, overgrown tree roots and utility works have affected the quality of the sidewalk, making it a challenge at times for even the most lightheeled walkers to keep on their feet. In addition, the patchworks of quick repairs of varying quality, which have been created in many streets not only affect the quality for pedestrians, but also that of urban design.

The programme aims to improve nearly 10% of the total pedestrian area of the capital. The total cost of the project is 60 million EUR, of which 50 million EUR is to be financed by a loan from the European Investment Bank (EIB), and the remaining 10 million EUR will be provided from the municipal budget.

EFFECTIVENESS

Information not available.

EXAMPLES OF APPLICATION

- <https://www.themayor.eu/en/a/view/sofia-will-replace-690-000-sq-m-of-battered-sidewalks-10564>

REFERENCES

- <https://www.eltis.org/in-brief/news/sofia-launching-extensive-sidewalk-renewal-programme>

4.12. HASSELT_ E-BIKES FOR PEOPLE WITH REDUCED MOBILITY

Belgium

The Belgian city of Hasselt has launched two electric bikes for people with reduced mobility: one is a wheelchair bike and the other one is a side-by-side tandem. Everyone will now have the possibility to cycle around the city, using adapted bicycles. With the introduction of this service, the city of Hasselt also developed a specific cycling trail for bikes, allowing riders to enjoy the ride through the city's natural landmarks, such as the Albert Canal, parks, lakes and the historic city centre.

OBJECTIVES

- The project aims to overcome obstacles for all people willing to ride. Through attentive urban planning and policy tools, cycling routes can be equally accessible to everybody.

DESCRIPTION

The city of Hasselt has purchased two adapted electric bicycles: one wheelchair platform bike and one duo bike.

- Wheelchair platform bike: Electrically assisted, which makes the cycling experience very comfortable. Suitable for people who would like to sit comfortably in their wheelchair during a bike ride. This way you can easily get out of the bike to visit a catering business, for example. The co-driver is ridden in the wheelchair without lifting assistance on the platform of the bicycle. The bike also has a wheelchair lock to ensure safety.
- Duo bike: Electrically assisted, which makes the cycling experience very comfortable.
- A tandem on three wheels where the cyclists sit next to each other and can communicate with each other. One person steers and both cyclists can pedal. You can get on without boarding and you can adjust the seats to the desired seat distance via a lever.

EFFECTIVENESS

Information not available.

EXAMPLES OF APPLICATION

- <https://www.city-rent.be/nl/35-2/>

REFERENCES

- <https://nl.outdooractive.com/nl/route/fietsen/belgie/toegankelijke-fietsroute-herkenrode/801637361/?share=%7Ezuvwriig%244osstjoh>
- <https://nl.outdooractive.com/nl/route/fietsen/belgie/toegankelijke-fietsroute-mombeekvallei-rapertingen-/801636422/?share=%7Ezuvppcwc%244ossthzt>
- <https://nl.outdooractive.com/nl/route/fietsen/hasselt/toegankelijke-fietsroute-kiewit/800416522/>

4.13. NAFPLIO_ BIKE-SHARING SYSTEM

Greece

The Municipality of Nafplio, a coastal city in the Peloponnese in Greece, has published its plans to set up a public electric bicycle sharing scheme, which includes bikes designed for those with disabilities.

OBJECTIVES

- To keep making progress towards sustainable mobility by developing and strengthening a shared network of electric and environmentally friendly vehicles.
- To develop and strengthen the city's shared network of electric and environmentally friendly vehicles which, in synergy with other interventions, will create a comprehensive and functional set of services and facilities that will contribute to improving mobility and promoting sustainable and inclusive mobility within the city.

DESCRIPTION

The project will put in place 36 public shared electric bicycles, as well as 2 shared electric bicycles for people with disabilities. It also involves the installation of a complete network of support services that will include rental terminals and shared locking stations (which can automatically charge the bicycle's battery while it is locked), as well as a complete programme for managing and monitoring the operation of the rental system. The electric bicycles are connected to a GPS system and will be accessible easily by residents and visitors through a dedicated app for smartphones. The budget of the project is €310.000.

EFFECTIVENESS

Information not available.

EXAMPLES OF APPLICATION

- <https://www.city-rent.be/nl/35-2/>

REFERENCES

- <https://nafplio.cyclopolis.gr/index.php/en/front-page-en/11-enc/frontpage-en/47-start-en>

4.14. **UK_ ACCESSIBILITY STANDARDS FOR ELECTRIC VEHICLE CHARGING**

United Kingdom

The UK's Department for Transport (DfT) announced on 30 June 2021 a partnership with Motability – a national disability charity – to assess and introduce accessibility standards for electric vehicle (EV) charge points.

OBJECTIVES

- The main objective of the UK's partnership with Motability to set accessibility standards for electric vehicle charging is to ensure that EV drivers can easily charge up their vehicles at public charge points throughout the country, regardless of their mobility.

DESCRIPTION

The UK's Department for Transport (DfT) has partnered with Motability to develop accessibility standards for electric vehicle (EV) charge points throughout the country. The British Standards Institution (BSI) will develop these standards, which will establish clear definitions of 'fully accessible', 'partially accessible', and 'not accessible' public EV charge points. The project aims to make it easy for EV drivers to charge up their vehicles at public charge points across the UK, regardless of their mobility, and to provide accessibility guidance to both operators and drivers.

EFFECTIVENESS

Information not available.

EXAMPLES OF APPLICATION

Information not available.

REFERENCES

- <https://www.gov.uk/government/news/uk-government-partners-with-disability-charity-to-set-standards-for-electric-vehicle-chargepoints>

4.15. **APP MAPS ACCESSIBILITY OF URBAN PUBLIC SPACES**

Ukraine

The Ukrainian disability rights group Dostupno.UA have published an update to its interactive map with accessibility information for more than 800 urban locations around the country. These cover urban public spaces, parks, administrative buildings, as well as eating and entertainment venues.

OBJECTIVES

- To allow users can check how accessible a particular location.

DESCRIPTION

The application works with a traffic light coding to tell users how accessible a location is: green is accessible, orange is somewhat accessible and red inaccessible. The rating is based on research of the group's members. A user can ask for specific information, too, such as entry conditions, accessible bathrooms, menus for visually impaired persons or more general categories such as if the location is child-friendly, pet-friendly or wheelchair-friendly.

EFFECTIVENESS

Information not available.

EXAMPLES OF APPLICATION

Information not available.

REFERENCES

- map.dostupno.ua

4.16. UK_STRATEGY

United Kingdom

New measures, backed by hundreds of millions of pounds, will help to ensure that people with disabilities in the UK can travel confidently and easily

OBJECTIVES

- To ensure that people with disabilities in the UK can travel confidently and easily

DESCRIPTION

The Department for Transport set out its Inclusive Transport Strategy, which will improve accessibility across all types of travel for those with both visible and less visible disabilities.

The strategy includes investment in rail accessibility infrastructure, commitments to produce league tables which highlight the rail operators that are delivering the best service for people with disabilities, and funding for accessible toilets at motorway service stations. The government will put up to £300 million of funding into extending the 'Access for All' programme to make railway stations more accessible, including through step-free access.

EFFECTIVENESS

- [The Inclusive Transport Strategy – summary of progress - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/publications/inclusive-transport-strategy)

EXAMPLES OF APPLICATION

Information not available.

REFERENCES

- <https://www.gov.uk/government/publications/inclusive-transport-strategy>
- https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/728547/inclusive-transport-strategy.pdf
- <https://www.gov.uk/government/publications/inclusive-transport-strategy/the-inclusive-transport-strategy-achieving-equal-access-for-disabled-people>

4.17. **PORTSMOUTH_ACCESSIBILITY APP**

United Kingdom

Portsmouth City Council in the UK has launched a new app designed to improve the travel conditions for persons with reduced mobility in the city

OBJECTIVES

- The aim of the Route4U app is to improve the travel conditions for persons with reduced mobility in the city of Portsmouth, UK. It provides wheelchair users with a route map and navigation system, as well as information on pavement obstacles, surface quality, kerb heights, pavement widths, inclines, and travel distances. The app also includes a survey function for reporting new obstacles or damage to pavements, and it can be customized to individual needs and preferences.

DESCRIPTION

The Route4U project is a joint effort of Portsmouth City Council, the app developers, and the Portsmouth Disability Forum. The project has resulted in the creation of a new app called Route4U, which is designed to help wheelchair users travel with ease. The app is customizable to individual needs and preferences and is available for both Apple and Android devices.

The Portsmouth Disability Forum supported the developers by traveling through the city and reporting on the pavement conditions and obstacles for the purpose of creating the app. The hope is that this free app will give people with disabilities the confidence to travel more independently and enjoy saving money by being less reliant on their cars for short distances. The app will also support Portsmouth's transport planners in improving pavement accessibility by providing analysis and decision support tools about problematic bottlenecks and barriers for wheelchair users.

EFFECTIVENESS

Information not available.

EXAMPLES OF APPLICATION

Information not available.

REFERENCES

- <https://www.eltis.org/discover/news/portsmouth-launches-app-help-wheelchair-users-trave>

4.18. **PARKING SPACES FOR PEOPLE WITH REDUCED MOBILITY. TECHNOLOGICAL TOOLS**

Spain

For many people who are disabled or have reduced mobility, use of a private vehicle is an essential tool to aid their mobility and integration. However, the effectiveness of this tool often depends on the correct behaviour of other road users.

One particular example is the correct use (i.e. respect by other road users) of the parking spaces that are specifically reserved for disabled people. Below are details of two technological tools that are designed to address this particular issue.

With particular regard to the case studies that are the focus of this report, said tools may be helpful in the following use cases:

- In San Sebastian: Installing sensors in reserved parking spaces.
- In Valencia: Pilot scheme involving the creation of 1060 smart parking spaces.

OBJECTIVES

- Improve the availability of parking spaces reserved for disabled people.

DESCRIPTION

For many people who are disabled or have reduced mobility, use of a private vehicle is an essential tool to aid their mobility and integration. This was recently acknowledged in Royal Decree 193/2023 of 21 March: among the measures designed to facilitate access on the part of disabled people to “goods and services related to citizen safety, emergency services, civil protection and road safety”, the Decree stipulated that with regard to both the procedure for obtaining a driving licence and the provision of road safety awareness and re-education courses, the needs of disabled people must be taken into account and the necessary measures to ensure universal accessibility adopted.

However, a vehicle’s effectiveness as a tool to aid mobility and integration often depends on the correct behaviour of other road users. One particular example is the correct use (i.e. respect by other road users) of the parking spaces that are specifically reserved for disabled people.

Every day, people with reduced mobility are greatly inconvenienced when other drivers illegally occupy these spaces, which are designed to provide more space for their users to move around in and to fold out or put away a wheelchair, as well as to provide safe access to buildings and services.

Technological innovation can provide solutions to these problems. Below are details of two technological tools that are designed to address said problems and have recently been introduced in two Spanish cities.

San Sebastian City Council is installing smart parking devices in order to prevent unauthorised drivers from using spaces that are reserved for people with reduced mobility.

The smart sensors work by asking drivers to confirm, via an app, that they are occupying the space because they are a registered disabled user. If an unauthorised driver occupies the space, he or she will be unable to confirm and the system will automatically alert the authorities. Police officers will be able to issue fines using the location indicated via the app. This feature will also

be able to direct users to available spaces, thereby reducing the pollution caused by having to drive around in search of a space.

With the aim of installing 350 devices, this smart mobility solution addresses a series of issues ranging from environmental sustainability to social justice, while at the same time improving the parking experience for the users for whom these spaces were designed.

Valencia City Council has launched a project to create 1060 smart parking spaces for people with reduced mobility, loading and unloading, and taxis. The system enables the smart management of restricted-use parking spaces by showing whether the spaces are free or occupied.

It will convert “ordinary” parking spaces into smart ones through the installation of sensors that can detect whether a space is occupied or not and share this information. In turn, this information will be made available to all users and can be easily accessed via the municipal website and the AppValència app. The parking [text cut off]

These smart spaces will create parking facilities in strategic locations around the city, with the aim of providing coverage in busy areas (especially those that are near important services such as health centres, markets, public transport hubs, etc.).

Of the 1060 spaces, 695 (27%) will be reserved for people with reduced mobility and additional software will be used in order to prevent their unauthorised use. The users of these spaces will be required to obtain a special parking card from the City Council. Via a geolocation-enabled mobile app, they can then use this card to identify themselves every time they park in one of these spaces. This will make it possible to determine whether the vehicles that are occupying these spaces are authorised to do so, and to monitor them and issue penalties if they are not.

EFFECTIVENESS

Information not available.

EXAMPLES OF APPLICATION

- San Sebastian uses sensors in parking spaces for disabled drivers in order to prevent illegal parking: <https://www.eltis.org/in-brief/news/san-sebastian-uses-sensors-disability-parking-spaces-counteract-illegal-parking>
- Valencia creates 1060 smart parking spaces with its pilot scheme: <https://www.eltis.org/in-brief/news/valencia-creates-1060-smart-parking-spaces-pilot-scheme>

REFERENCES

- Royal Decree 193/2023 of 21 March regulating the basic conditions of accessibility and non-discrimination for disabled people with regard to accessing and using goods and services that are available to the public: <https://www.boe.es/eli/es/rd/2023/03/21/193>

4.19. ACCESSIBILITY FOR ALL/UNIVERSAL DESIGN

Denmark

The Danish Road Standards has developed a quality control system called Accessibility Audit (AA) which helps secure the accessibility for all in road schemes. The audit is carried out at different stages in the design process by certified auditors.

The system is parallel to the Road Safety Audit system.

OBJECTIVES

- To make sure that any new road scheme offers the best possible accessibility for all. Safety is likewise considered in the process.

DESCRIPTION

The AA process is described and the most important principles in Universal design are covered in the publications. A certification system has been developed whereby professionals can attend a course and be certified.

EXAMPLES OF APPLICATION

- <https://vejregler.dk/h/7e0fba84-06dd-483b-898a-c7b3e3affaa1/a3d8634a5fdf4f81bf6d5ba08032b349?showExact=true>
- <https://vejregler.dk/h/7e0fba84-06dd-483b-898a-c7b3e3affaa1/0fc3fb597bf94bbb94f32289cbd7e239?showExact=true>
- <https://en.vejregler.dk/h/7e0fba84-06dd-483b-898a-c7b3e3affaa1/vde-2014-0003?showExact=true>

5. PERSONAL MOBILITY DEVICES

5.1. PREVENTING DRINK-DRIVING AMONG YOUNG E-SCOOTER DRIVERS - TIER APP

Germany

A recent study found that 20% of injuries sustained by e-scooter users were sustained while under the influence of alcohol. This research (and other studies) indicate that traumatic brain injuries (TBI) are among the most severe injuries sustained by e-scooter users that ride under the influence of alcohol.

Drinking and riding an e-scooter is an entrenched problem facing our sector and, to date, no-one has adequately tackled the issue

OBJECTIVES

- Remind riders about the dangers of drinking and riding an e-scooter.
- Encourage riders to take a taxi home if they have been drinking, rather than take a scooter.
- Make it as easy as possible for riders to get home quickly if they have been drinking. The target audience of the campaign is any e-scooter user who is likely to use our service whilst under the influence of alcohol.

DESCRIPTION

The anti-drink-riding' feature is active in the TIER app between 9pm and 4am on Thursdays, Fridays and Saturdays. It's simple but effective. In London, for example, riders are reminded of the laws on drink-riding and asked if they are okay to ride. If they have been drinking, an in-app notification will direct them to book a taxi via a FREE NOW app. The design of our 'anti-drink-riding' feature was informed by our research partnership with Innovation Bubble, which found that there are both psychological and pragmatic drivers behind why people drink and then ride an e-scooter. 1. Psychological insights: Research found that those who drink and ride don't feel they have ever consumed enough alcohol that would pose a danger to themselves or others. They base this on a feeling of control, rather than looking at the actual metrics of alcohol they have consumed. People choose scooters as a mode of transport after drinking because it allows them to have control over their journey home. They can set the speed, route and timing of their journey. Our research also found that people were optimistic about how much alcohol affected them; they believed even if they were tipsy they were still in control. 2. Pragmatic insights: Our interviews also showed that participants lacked awareness of the legal implications of drinking and riding an e-scooter. Riders interviewed also felt that the decision was also spontaneous so they didn't think through the consequences of drink-riding, plus with a shorter journey they felt the perceived risk was lower. TIER's feature aims to give riders control over their journey by allowing riders to easily reach their destination via a cab and providing timely reminders of when it is not safe to ride an e-scooter.

EFFECTIVENESS

Across all cities, 138,000 riders have seen the message so far.

EXAMPLES OF APPLICATION

Information not available.

REFERENCES

- <https://www.tier.app/drinking-and-riding-dont-mix/>
- <https://www.dailymail.co.uk/sciencetech/article-9667929/Tier-e-scooters-London-...>
- <https://www.oslotaxi.no/artikkel-tier-og-oslo-taxi>
- <https://www.nettavisen.no/okonomi/tier-og-oslo-taxi-inngar-samarbeid/s/12-95-34...>
- <https://www.msn.com/nb-no/nyheter/norge/tier-og-oslo-taxi-inng%C3%A5r-samarbeid...>
- <https://www.taxiforbundet.se/taxi-stockholm-i-nytt-samarbete-som-ska-minska-alk...>
- <https://www.kauppalehti.fi/uutiset/tier-ja-taksi-helsinki-aloittavat-yhteistyon...>
- <https://www.micromobilitybiz.com/tier-free-now-launch-anti-drink-riding-feature...>
- <https://bloomnews.org/tier-e-scooters-in-london-will-now-ask-if-youve-been-booz...>

5.2. **SPECIFIC LEGAL FRAMEWORK AND MANUAL ON PERSONAL MOBILITY VEHICLE (PMV) CHARACTERISTICS**

Spain

By means of Royal Decree 970/2020 of 10 November, modifications have been made to the General Traffic Regulation and General Vehicle Regulation, in order to provide a specific and homogeneous legal framework for personal mobility vehicles (PMVs).

Moreover, one of the main aspects arising from this modification is the preparation and publication by the Directorate-General for Traffic (DGT) of a Manual on PMV Characteristics, which establishes the technical requirements PMVs must meet in order to be certified and approved for transit, as well as their classification and identification.

OBJECTIVES

- Provide PMVs with a specific and homogeneous legal framework.
- Identify PMV models and ensure that they meet the technical requirements stipulated by the national and international regulations.

DESCRIPTION

In recent years, the presence of PMVs in Spanish cities has become a reality that, along with other factors, is transforming mobility in urban areas. According to different estimates, there are over 1 million PMVs circulating in cities every day. In 2020 8 PMV users died, 97 were hospitalised due to injury and 1097 suffered injuries not requiring hospitalisation.

Royal Decree 970/2020, of 10 November, amending the General Road Traffic Regulation, approved by Royal Decree 1428/2003, of 21 November, and the General Vehicle Regulation, approved by Royal Decree 2822/1998, of 23 December 1998, on urban traffic measures, provided a specific legal framework for personal mobility vehicles.

One important aspect is that, in order to be used for transit, these vehicles require a certificate of circulation to ensure that they meet the technical requirements stipulated in the national and international regulations as set out in their Manual on Characteristics, and to enable their identification.

To this end, the Autonomous Central Traffic Office has drawn up and approved (by means of a decision issued by its head) a Manual on PMV Characteristics, which establishes the technical requirements that PMVs must meet in order to be approved for transit, their classification, the testing process for their certification, and the mechanisms to be used for ease of identification. This manual will be updated whenever there is a change in the regulatory criteria for vehicles, or whenever the emergence of new forms of mobility so requires.

Additionally, the manual establishes an obligation on the part of manufacturers or authorised representatives to hold a certificate of circulation for a make, model and specific version, which guarantees compliance with a series of technical and identification requirements.

From 22 January 2024 onwards, all PMVs sold commercially must be certified as described above in order to be used. Vehicles that are sold prior to this date may continue to be used for the next five years, even if they do not have a certificate of circulation.

EFFECTIVENESS

Information not available.

EXAMPLES OF APPLICATION

Information not available.

REFERENCES

- Royal Decree 970/2020 of 10 November modifying the General Traffic Regulation and General Vehicle Regulation: <https://www.boe.es/eli/es/rd/2020/11/10/970>
- DGT Decision of 12 January 2022 approving the Manual of PMV Characteristics: [https://www.boe.es/eli/es/res/2022/01/12/\(3\)](https://www.boe.es/eli/es/res/2022/01/12/(3))

5.3. CAMPAIGN TO PROTECT PEDESTRIANS

Spain

Since RD 2/970 came into force on January 2020, amending the General Vehicle Regulations and the General Traffic Regulations, two regulatory texts that were approved by the Council of Ministers on November 10, 2020, personal mobility vehicles, among which are scooters, they are considered vehicles for all purposes so their drivers are obliged to comply with the rules of the road, in the same way as the rest of drivers of cars and motorcycles.

This implies, for example, that these vehicles cannot circulate on sidewalks, in addition to being prohibited from circulating on interurban roads, crossings, highways, highways or urban tunnels. However, the reality is that not all users respect the rule, some due to mere ignorance, and it is common to see scooters circulating on the sidewalks, a behaviour that not only generates complaints among citizens but is also dangerous for pedestrians, reaching in some cases to produce accidents.

OBJECTIVES

- To raise awareness of respect for pedestrian mobility, remembering that sidewalks are an exclusive space for walking.

DESCRIPTION

Under the slogan "It does not happen", the campaign plays with some questions of general culture of which nothing happens for not knowing the answer, to make it clear later that the bicycle and the scooter "do not pass" on the sidewalk. This can be seen in buses and urban supports of Madrid, Seville, Valencia, Zaragoza and Malaga, and also has radio spots and pieces for digital media and social networks nationwide

EFFECTIVENESS

- Information not available.

EXAMPLES OF APPLICATION

Information not available.

REFERENCES

- [DGT - Por la acera](#)

5.4. **PLAN NATIONAL POUR MIEUX RÉGULER LES TROTTINETTES ÉLECTRIQUES**

France

With almost 2.5 million users, the use of electric scooters is growing steadily in French towns and cities. Alongside bicycles and public transport, they are a new tool for sustainable everyday mobility.

However, regulation is sometimes inadequate. As a result of incivilities and accidents, the development of these new forms of mobility has become chaotic in the eyes of our fellow citizens.

OBJECTIVES

- National plan to regulate and supervise electric scooters.

DESCRIPTION

Packed with regulatory measures and strong commitments from operators, this plan will improve the safety of users and other users, ensure better integration into public spaces and enhance the environmental performance of these forms of mobility.

EFFECTIVENESS

Information not available.

EXAMPLES OF APPLICATION

Information not available.

REFERENCES

- https://www.ecologie.gouv.fr/sites/default/files/2023.03.29_DP-trottinettes_WEB-1.pdf

5.5. **INTERNATIONAL CONFERENCE ‘THE FUTURE OF ELECTRIC SCOOTERS IN SLOVENIA’**

Slovenia

The rise of this mode of transportation, along with changes in the micro-mobility sector, poses new challenges for policy makers. Electric scooters are becoming more and more popular, but for years data has shown that they are not among the safest modes of transportation. The consequences of traffic accidents they are involved in are getting graver.

OBJECTIVES

- Forum for the exchange of knowledge and best practices.

DESCRIPTION

The Slovenian Traffic Safety Agency and Zavod VOZIM, the national coordinator of the European Road Safety Charter, carried out an international conference “The future of electric scooters in Slovenia”.

EFFECTIVENESS

Information not available.

EXAMPLES OF APPLICATION

Information not available.

REFERENCES

- https://www.vozim.si/cache/documents/59fc168e294b911fd80153fd/Conference_AGE_NDA_Flyer_EN.pdf

5.6. PRACTICAL TRAINING IN THE SAFE USE OF ELECTRIC SCOOTERS, SKATEBOARDS AND PERSONAL MOBILITY VEHICLES

Spain

In 2020, there were more than 1,000 scooter-related accidents, with 109 serious injuries and six deaths. As the popularity of the scooters increases, so does the number of incidents.

OBJECTIVES

- Training programme to provide practical support to youngsters from the age of 16 using electric scooters, skateboards and other personal mobility vehicles (VMPs).

DESCRIPTION

The training programme at a specialist driving centre is divided into an awareness discussion about the use of personal vehicles and practical experience on a course designed to simulate an open road.

Teaching the basic rules of the road, including the meaning of different signs, is a core element of the training, before the young people take part in different scenarios on the practice track. These include wearing goggles to simulate the effects of having been drinking and various balance tests.

EFFECTIVENESS

Information not available.

EXAMPLES OF APPLICATION

Information not available.

REFERENCES

- <https://road-safety-charter.ec.europa.eu/resources-knowledge/media-and-press/spanish-initiative-aims-reduce-scooter-accidents>

5.7. TAKEVE, DELIVERY MODEL THAT IS ETHICAL, INCLUSIVE AND SECURE

Italy

The delivery sector is the one that most needs road safety regulation.

OBJECTIVES

- To create a model of employment, inclusion and security.

DESCRIPTION

- Trained and launched the fleet model of professional riders and hired in the delivery and e-commerce sector.
- Installation of Takeve Points, refreshment points and departure of riders, where hiring, training, and meeting points are carried out.
- Study of attitudes, social habits and cultural level of the average of our riders to facilitate and make beautiful, innovative, effective and simple training on hygiene, protection and above all road safety.

EFFECTIVENESS

Riders are more aware of road safety rules, as, through the dynamics of the game, in edutainment logic, the implementation of the theory is a natural consequence.

EXAMPLES OF APPLICATION

Information not available.

REFERENCES

- <https://road-safety-charter.ec.europa.eu/it/content/takeve-un-modello-unico-di-delivery-etico-inclusivo-e-sicuro>

5.8. SAFETY OF E-SCOOTERS

The Slovak Republic

This year since January 1st to August 31st there has been 9 deaths of cyclists/e-scooters users (data of Police of The SR). Although it is 11 less than in 2022 it is still a high number. One of many negative aspects of the rapid development of shared urban micromobility is failure to comply with traffic laws and incorrect parking of e-scooters.

OBJECTIVES

To draw an attention to correct riding on e-scooters and to correct parking of e-scooters

DESCRIPTION

Informative posts on social media about proper use of e-scooters

EXAMPLES OF APPLICATION

- <https://www.facebook.com/BECEP.SR>

REFERENCES

Police statistics about cyclist/e-scooters fatalities:

https://www.minv.sk/Inisdn/statistika/20230905_015202.661_2023-08-ML/statistika/mesacna/dkvr/dkvr-SR.html

5.9. EVALUATION OF THE E-SCOOTER PILOT SCHEME

Denmark

Denmark has introduced e-scooters in traffic via a pilot scheme. The pilot scheme regulation states that an evaluation of the pilot scheme is mandatory. The evaluation uses data from the rental e-scooters in the big cities, accident data, and collected data on the behaviour of users.

OBJECTIVES

The evaluations are meant to be used as a basis for reviewing the legislation, including safety measures, if needed.

DESCRIPTION

The evaluations are intended as indicators to follow the progress on areas like usage, behaviour, accidents and environmental impact of e-scooters. Based on the evaluations assessments are made as to whether the legislation needs to be changed or other measures have to be taken to maintain a high level of road safety.

EFFECTIVENESS

There have been no changes in the pilot scheme after the first evaluation. The second evaluation is scheduled to be published within this year.

REFERENCES

The first evaluation is unfortunately not in English. The Danish version can be downloaded via this link:

<https://fstyr.dk/da/Lister/Presse/Presse/2020/02/Foerste-evaluering-af-forsogsordninger-for-smaa-motoriserede-koeretoerjer>

5.10. SEED - SAFE E-SCOOTER DRIVING

Austria

Current regulations equate electric scooters with bicycles. However, from the point of view of driving dynamics, there are significant differences between these types of vehicles.

Since this risk could be further increased by the use of e-scooters, the SEED project focuses on research into risky and dangerous driving dynamics and their influence on road safety when using e-scooters.

OBJECTIVES

The aim of the research project is to develop proposals for constructive and functional guidelines, compliance with which will substantially increase driving and road safety for e-scooters. The aim is to create objective and comparable methodologies.

Analyse the sources of danger as well as the driving dynamics of electric scooters.

DESCRIPTION

Objective measurement and analysis methods are used to collect and evaluate vehicle dynamics data. It is important to be comparable in terms of road safety, such as braking distance or safe manoeuvres in special situations. This can be achieved by creating and conducting uniform and therefore comparable course tests.

From there, some key features should be extracted that are easy to understand and at the same time decisive (accident-causing parameters such as tyre size and width, wheelbase, steering axle angle, curve radii, road width, etc.) and provide appropriate recommendations for the legislator. Its aim is to ensure quickly and effectively that the design and execution of these vehicles are at least adapted to the needs of road traffic, so that electric scooters, especially as rental vehicles, can be operated intuitively and clearly, are as easy to control as possible and thus driving insurance. Another result is the creation of uniform course designs for safe handling training (e.g. in schools).

REFERENCES

<https://www.ait.ac.at/themen/verkehrssicherheit-und-unfallforschung/projects/seed>

An accidents involving e-scooters survey is currently being carried out. The survey is aimed at people who have been involved in accidents involving e-scooters both as witnesses and those involved in the accident.

5.11. EVALUATION REPORT - SCIENTIFIC RESEARCH OF THE PARTICIPATION OF PERSONAL LIGHT ELECTRIC VEHICLES IN PUBLIC ROAD TRAFFIC

Germany

Until the Personal Light Electric Vehicles Regulations came into force on 15 June 2019, only specific self-balancing mobility aids – e.g. so-called “Segways” – could be used in public road traffic in Germany in accordance with the Mobility Aid Regulations. Therefore, the Federal Ministry for Digital and Transport has developed the Personal Light Electric Vehicles Regulations (PLEV Regulations) to enable the use of personal light electric vehicles with handlebars or stanchions to participate in public road traffic.

OBJECTIVES

The Federal Ministry for Digital and Transport shall review the Regulations in terms of their effectiveness, objectives and impact on road safety, based in particular on the findings of supporting scientific research. On the basis of this evaluation, the Federal Ministry for Digital and Transport shall, if appropriate, present a proposal for amending these Regulations.

DESCRIPTION

As part of the multi-annual research project, the safety aspects of personal light electric vehicles in public road traffic were examined. In addition to the behaviour and movement patterns of users, the main focus of the activities was analyses of critical situations and traffic accidents. The project duration spanned a period from May 2020 to October 2022.

EFFECTIVENESS

It is planned to present a proposal for amending the PLEV Regulations.

REFERENCES

The evaluation report is only available in German and can be downloaded at the following link:

<https://bast.opus.hbz-nrw.de/frontdoor/index/index/docId/2790>