



## Deliverable 5.3

# Vision policy recommendations for user-centric CCAM



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## Executive Summary

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The Deliverable 5.3 is part of the SINFONICA WP 5 on “Strategies, Methodologies and Recommendations for an inclusive equitable and accessible future CCAM”. It is shaped by the identification and analysis of the key components leading to the definition of policy recommendations, both in the short and long term. In doing that, the backbone of the analysis is articulated in four chapters:

1. **The taxonomy of policy tools and instruments available to the policy makers** (chapter 2), aiming at identifying and classifying the most relevant policy instruments, providing indications on what types of policy makers should be primarily involved in their implementation.
2. **Reviews of policies undertaken and embedded in legislation from a sample of EU countries** and international experiences (Chapter 3). The sample of EU countries has benefited of information provided by the SINFONICA partners (France, Germany, Greece, Italy, The Netherlands and UK) according to a common template (presented in Appendix A).
3. **Insights from recent EU projects** dealing with CCAM services and public transport (Chapter 4), in which, based on the work carried out in the previous SINFONICA Deliverable 5.1 (SINFONICA, 2023), seven CCAM projects have been reviewed, due to their direct relevance in terms of shared public CCAM services.
4. **Analysis of the contributions from the SINFONICA Workshops** on the matter (Chapter 5) which gathered several stakeholders (e.g., citizens, operators, policy makers) around a table, to discuss how CCAM services could be deliverable in more equitable and inclusive way (see Appendix B for Workshops agenda).

The taxonomy of policy instruments identifies four groups of policy domains, according to the relevant **policy instruments** in operation:

1. **Rules and regulations instruments**, e.g. decrees, laws, etc, encompassing the policy domains of regulatory framework, accessibility, interoperability & standardisation, data governance and setting standards on safety and security.
2. **Market-based instruments**, basically addressing accessibility and equity, and involving instruments like subsidies and taxes, Research & Developments grants, etc.
3. **Infrastructure development**, involving actions in terms of infrastructure integration, urban planning and development of the necessary components for making interoperability possible, e.g. at nodes and interchanges for public transport.
4. **Information and awareness**, in which the design and implementation of awareness campaign and communication plays an important role, through workshops, information campaigns, etc.

**Rules and regulations are essential** to ensure that CCAM are **safe, accessible, and acceptable for everyone**. The analysis emphasizes the need to adapt and integrate existing regulations, and develop new CCAM-specific standards, and promote collaboration between public authorities, private operators, and interest groups. In terms of responsibilities, the role of EU and national policy makers are predominant, given that the set-up of harmonised EU rules and regulation can support actors at regional and local level.

**Market-based instruments** provide a wide array of instruments and market tools to policymakers, highlighting the need for an economic approach based **on attractive business models, public incentives, public-private** partnerships, and comprehensive cost-benefit analyses. Service flexibility and added value for users are key elements for enhancing the adoption of CCAM. In terms of accessibility to everyone, it will be important to consider in such a class of instruments the likely lowest willingness to pay of vulnerable groups (elderly, disabled, young). In such a context, the role of Research & Development programmes, subsidies and funding from EU, national and local authorities is fundamental to overcome low-income barriers, supporting demand at least in the short-term period.

**Infrastructure development** is a key instrument under the control of policy makers at EU, national and local level, to enable the effective adoption of automated vehicles in public transport. This requires significant investments, strategic planning at urban level, and an inclusive approach that considers the needs of all users, with a special focus on accessibility, safety, and sustainability. Besides, digital infrastructure is a prerequisite for connectivity, communication, and security in an automated transport system.

**Awareness campaigns and communications** represent essential tools in improving policy recommendations for CCAM adoption in public transport. By addressing public concerns, providing clear information, and building trust, awareness efforts can help create an informed society that is ready to embrace automation technology, while ensuring that transport services remain safe, accessible, and sustainable. The establishment of an **advisory panel** composed of people with disabilities or other mobility challenges is recommended to develop the campaigns. In such a context, the role of **Public Authorities and operators** is crucial. They can fund campaigns, providing financial support to sustain awareness efforts. They can coordinate efforts, conveying messaging consistency and targeting the right audience. They can also collaborate with stakeholders, establishing partnerships with industry operators, tech companies, and user associations, enhancing in such a way campaigns effectiveness.

**Concerning legislation**, the sample of European countries reviewed as part of this task shows two main trends: 1) integration of autonomous vehicles in the national Road Code, specifying conditions to run trials and demonstrations according to national safety standards. 2) Dispositions for funding R&D in the sector, fostering research and trials on automated vehicles and promoting Memorandum of Understanding with industries and research institutes.

But what is still needed is a more decisive step towards the **consideration of vulnerable groups of user's needs**. Despite some steps forward (e.g., The French Loi d'Orientation des Mobilités) requirements on how to design and adapt CCAM services serving the purpose of more inclusivity are lacking in the EU legislation on the matter. Common standards are lacking at international level on privacy, data management and protection from cyberattacks. Ethical and liability issues in case of accidents are still not defined. Besides, safety, legal & liabilities rules, that although addressed in general with reference to autonomous vehicles, have to be adapted to vulnerable users' specific needs.

**For national/European governments:** They are responsible, on the one hand, for establishing the harmonized and systematic framework for approving CCAM vehicles, supporting local authorities in creating political goals or motivations to lay the foundations automated shared public services. On

the other hand, they can play a fundamental role in funding and promoting research & development with industries and PTOs.

**For Public Transport Authorities (PTAs) and Operators (PTOs):** They are responsible for CCAM operational services to be efficient and effective. CCAM services must meet the basic requirements set by local PTAs regarding service quality, including reliability, passenger capacity and accessibility for people with vulnerabilities.

**For cities and regional/local authorities:** Local authorities should define use cases and features for automated shuttles, accordingly, guiding the development of technical capabilities by PTOs and PTAs. Cities should also offer potential use cases to test automated shuttle fleets in real operational environments, supporting development through understanding current technological limitations. The CCAM services integration into strategic plan, as Sustainable Urban Mobility Planning (SUMP) and into local infrastructure (public transport network) should strengthen the importance of CCAM services into the local mobility.

**The SINFONICA Workshops** dealt more closely with operational aspects of CCAM and vulnerable groups of user's needs (elderly, people with cognitive disabilities, digital vulnerable people, persons with reduced mobility, women and gender related vulnerabilities).

**On the operational side,** recommendations were provided about how to make CCAM services convenient and profitable for users and operators, in the specific demand segment of short-range services integrated to public transport. **Service requirements** as frequency, speed, real-time route information, role of staff and accessibility were considered fundamental to attract demand, for all type of users (including those with vulnerabilities). Public transport operators and Road Authorities should also collaborate, in terms of a **clear framework for public service obligations**, conditions for delivering the CCAM services, and more in general a consistent program of requirements for a bus concession.

**On the inclusivity side for vulnerable groups of users,** policies to promote accessibility and inclusiveness must be accompanied by policies addressing **safety & security**. Policies giving importance to accessibility and inclusiveness are important, but it is also true that in order to make them realistic and operational, there must be attention to safety. The **elimination of architectural barriers** is a necessary condition for bringing people with mobility challenges closer to new forms of mobility.

**The role of information and education.** Information desks or roaming staff on which people with disabilities who need to learn more about travel or other, can go to ask for information. Digital sources of information alone are not enough. If an authority or operator uses only the Internet (including on social media) for communication and information, many potential users will not be able to access it.

All in all, the emerging policy recommendations disclose a **vision of user-centric CCAM** underpinning an ideal roadmap to more inclusive and equitable services as follows:

In the short term (up to 5 years):

- Definition of design and requirements for including vulnerable groups of users in terms of accessibility to vehicle and infrastructure.
- Supporting CCAM services operators and users through public service obligations addressing flexibility, staffing requirements and subsidies.
- Launching campaigns for raising public awareness, information and discussion on CCAM services, limitations and benefits, involving associations of vulnerable groups of users.
- Planning & integration of CCAM services in public transport and mobility strategies at urban level.

In the longer term:

- Establishing a common framework on liability & responsibilities in case of accident, privacy and cybersecurity and ethical issues.
- Definition of sustainable business models, including the assessment of willingness to pay for CCAM services, Level of Service and Cost-Benefit analysis.
- Set up of appropriate digital infrastructure, in the direction of smart cities (enhancing V2V and V2I communication) and development of apps tailored to vulnerable groups of users.

In terms of future research, some questions emerged from the analysis of policy recommendations may be of inspirations:

- **How to transform automated mobility into a set of integrated services?** The integration of CCAM services in the urban fabric of public transport services is an issue. More use cases and trials demonstrating that integration is feasible and desirable are needed.
- **Which business model could be established?** Testing and evaluating different business models in different pilot sites and (urban) traffic environments is needed.
- **Could CCAM services led to undesirable behaviours**, for example modal shift from cycling and walking instead of from trips by car, in particular for younger generations, most likely to be interested in automated mobility services?
- **How to reconcile ethical concerns** with the requirements enshrined in privacy protection laws for the collection of personal data?

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## Abbreviations

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ACT	Automated and Connected Transport
ADAS	Advanced Driver Assistance Systems
AVs	Automated vehicles
CAD	Connected Automated Driving
CAV	Connected, automated vehicle.
CATS	Connected Automated Transport Systems
CCAM	Connected, cooperative and automated mobility.
DRT	Demand Responsive Transport
Goi	Group(s) of Interest
IoT	Internet-of-Things
KPIs	Key Performance Indicators
MaaS	Mobility as a Service
NRA	National Road Administration
OEM	Original Equipment Manufacturers
HMI	Human Machine Interface
SAE	Society of Automotive Engineers
V2V	Vehicle-to-vehicle
V2I	Vehicle to Infrastructure
VRU	Vulnerable Road Users
WP	Work Package

## 1. Introduction

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### 1.1 Aims of this Deliverable

This Deliverable draws conclusions in terms of policy recommendations arising from the work done in WP5 “Strategies, methodologies and recommendations for an inclusive equitable and accessible future CCAM”. More specifically, the policy conclusions presented in the Deliverables are based on the results from the groups of interest (engagement of users and stakeholders), the analysis of EU projects dealing with CCAM services (SINFONICA D5.1) and the analysis of CCAM services (SINFONICA D.5,2)

The target audiences of this Deliverables are policy makers, operators and public at large, willing to make CCAM services more equitable and inclusive.

### 1.2 Structure of the document

The structure of this Deliverable is shaped by the identification and analysis of the key components leading to the definition of policy recommendations, both in the short and long term. In doing that, the structure of the Deliverable reflects the four components leading to the definition of policy recommendations:

- The taxonomy of policy tools and instruments available to the policy makers (A taxonomy of policy domains, Chapter 2), aiming at identifying and classifying the most relevant policy instruments, providing indications on what types of policy makers should be primarily involved in their implementation.
- Policies undertaken and embedded in legislation from a sample of EU countries and international experiences (Policies from a sample of EU countries and international experiences, Chapter 3). The sample of EU countries has benefited of information provided by the SINFONICA partners (France, Germany, Greece, Italy, The Netherlands and UK) according to a common template (presented in Appendix A).
- Insights from recent EU projects dealing with CCAM services and public transport and SINFONICA Workshops (Policies from a sample of EU projects and SINFONICA Workshops, Chapter 4), in which, on the basis of the work carried out in the previous SINFONICA Deliverable 5.1 (SINFONICA, 2023), seven CCAM projects have been reviewed, due to their direct relevance in terms of shared public CCAM services. Chapter 4 also includes the analysis of the contributions from the SINFONICA Workshops on the matter, gathering several stakeholders (e.g., citizens, operators, policy makers) around a table, to discuss how CCAM services could be deliverable in more equitable and inclusive way.
- Chapter 5 finally draws conclusions in terms of vision and roadmap in the direction of more equitable and inclusive CCAM services and Chapter 6 provides indications on future research needs emerging from the analysis.

### 1.3 Background

The background of this Deliverable lies on the work done in WP5 “Strategies, Methodologies and Recommendations for an inclusive equitable and accessible future CCAM”. More specifically:

- the Deliverable 5.1 on “Equity practices and social indicators” has examined 40 EU funded projects (funded under the Horizon 2020 and Horizon Europe framework programmes), generally carried out and completed in the period between 2016 and 2022. The analysis has been important for the identification of seven EU projects dealing with CCAM shared public services (CATAPULT, SOHJOA BALTIC, SHOW, FABULOS, L3PILOT, AVENUE and RIDE2AUTONOMY). In such a context, the knowledge base of the Deliverable D5.1. has considered the contributions that the selected EU projects have provided to policy conclusions.
- the Deliverable 5.2 on “CCAM solutions and vulnerable users: Opportunities and constraints”, has developed an overview of inclusive features of a Connected Cooperative and Automated mobility (CCAM) operation. It has focused on the opportunities and constraints of public and shared transport using CCAM regarding users with specific needs. It has assessed recent and ongoing CCAM demonstrations in Europe which provide public or shared transport services to citizens. This Deliverable has represented an important background for this Deliverable, to the extent that it has allowed to frame policy conclusions with reference to specific CCAM services.
- last but not least, the series of Workshops and co-creation activities of which at Chapter 4, 4.2 Contribution of the SINFONICA Workshops to policy recommendations.

## 2. A taxonomy of policy domains

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Policy domains can be assumed as broad thematic areas which include policy tools and mechanisms used by governments and organizations to develop transport policy. **As general remark it is important to consider that in SINFONICA reference to CCAM services must be understood as public shared services on road (bus, shuttle, etc).** The following policy domains set forth several policy considerations in the realm of CCAM services. Their identification is based on literature review<sup>1</sup>, corroborated by insights from the background material to this Deliverable. For example, the importance of accessibility and equity domains have been stressed in the SINFONICA D1.1 (SINFONICA, 2023)

1. **Regulatory Frameworks:** Establishing clear regulations and standards for the operation of CCAM is crucial. This includes defining requirements for **safety, data protection, cybersecurity, insurance, and liability**.
2. **Infrastructure Development:** Public transport systems need to adapt their infrastructure to accommodate CCAM, in particular with reference to the crucial issue **of the integration of CCAM services with transport infrastructure (i.e. last mile integration)**. This may involve creating dedicated lanes, implementing smart traffic management systems, and ensuring compatibility with existing infrastructure.
3. **Accessibility and Equity:** Policymakers need to address concerns **about equitable access** to CCAM enabled public transport services. This includes ensuring affordability, accessibility for everybody (specifically for people with disabilities), equitable distribution of services across different communities, as well as fares/pricing/ticketing.
4. **Data Governance:** CCAM operation generate vast amounts of data, e.g. location data, sensor data, and passenger information. Policymakers need to **establish rules for data collection, storage, sharing, and privacy protection** to ensure transparency and protect user rights.
5. **Safety and Security: Safety is a paramount concern with CCAM.** Policymakers must establish rigorous safety standards and protocols for CCAM to minimize the risk of accidents, cybersecurity (privacy and data management) and personal safety (threats from assault, robbery, antisocial behaviour, etc.).
6. **Environmental Impact:** While CCAM has the potential to reduce congestion and emissions through more efficient driving patterns, in particular when they increase the use of public transport at the expenses of private car trips, its **widespread adoption could also lead to increased energy consumption and environmental degradation**, if not managed properly. Policies promoting sustainable CCAM deployment, such as incentivizing electric and shared green autonomous vehicles, are essential.
7. **Public Acceptance and Trust:** Building public trust and acceptance of CCAM is crucial for their successful **integration into public transport systems**. Policies that address concerns about safety, privacy, job displacement, and societal impact can help foster acceptance and adoption.

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<sup>1</sup> EC (2019) for an overview on policies and instruments in EU transport policy

8. **Interoperability and Standardization:** Policymakers need to encourage interoperability and standardization among different CCAM systems and technologies to **ensure seamless integration** into public transport networks and promote competition and innovation.
9. **Workforce Impact:** The widespread adoption of CCAM in public transport may have implications for the workforce, including **potential job displacement for drivers**. Policymakers need to consider strategies for retraining and transitioning affected workers, as well as ensuring labour rights and protections in the emerging CCAM industry. On the other hand, the introduction and take up of CCAM services could demand new job profiles, as onboard assistants for people with mobility challenges and to inform/reassure passengers in general.

Based on such a taxonomy of policy domains, for the sake of clarity and simplification, we proceed in the analysis with a further aggregation by homogeneous groups, identifying four groups of policy domains, according to the relevant **policy instruments** in operation. The proposed aggregation is the following:

- **Rules and regulations instruments**, e.g. decrees, laws, etc, encompassing the policy domains of regulatory framework, accessibility, interoperability & standardisation, data governance and setting standards on safety and security.
- **Market-based instruments**, basically addressing accessibility and equity, and involving instruments like subsidies and taxes, Research & Developments grants, etc.
- **Infrastructure development**, involving actions in terms of infrastructure integration, urban planning and development of the necessary components for making interoperability possible, e.g. at nodes and interchanges for public transport.
- **Information and awareness**, in which the design and implementation of awareness campaign and communication plays an important role, through Workshops, information campaigns, etc.

For each group of policy domains, it follows a review of the key tools and type of policy actors involved, at different scale (local, regional and national)<sup>2</sup>.

## 2.1 Rules and regulations

Rules and regulations play an important role in the toolbox for policy recommendations. Rules and regulations spread indeed across a wide range of policy domains, determining, by the others, standards on safety, CCAM design and infrastructure. Table 1 shows the key policy domains in which rules and regulation can be classified.

*Table 1: Rules and regulations by policy domains*

Policy domains	Rules and regulations
Infrastructutre & Interoperability	<ul style="list-style-type: none"> <li>• <b>Infrastructure Regulation:</b> Regulations should also address the necessary infrastructure to support CCAM, such as accessible stops and road signage. A lack of adequate infrastructure could <b>limit accessibility for people with disabilities</b>.</li> </ul>

<sup>2</sup> A deeper view on the role of local actors can be in chapter 4 on the insights from SINFONICA Workshops and Groups of Interest

Policy domains	Rules and regulations
	<ul style="list-style-type: none"> <li>• <b>Interoperability:</b> Standards should <b>ensure interoperability</b> between different automated transport systems and services. Harmonizing regulations and sharing experiences among operators are essential for an efficient and safe transport system.</li> </ul>
Standards on Safety and Data protection	<ul style="list-style-type: none"> <li>• <b>Safety Standards: Clear safety standards</b> for CCAM should be established, covering both physical safety and cybersecurity. CCAM must be able to interact safely with all road users, including pedestrians and cyclists, vulnerable groups of road users.</li> <li>• <b>Safety and Liability:</b> Regulations should also <b>clarify liability in case of accidents</b>. It is crucial to define who is responsible for the operation of automated vehicles to ensure the safety of users and the public. This is true when vulnerable groups of users are involved. They indeed tend to be exposed to higher risks during the journey and therefore require major attention.</li> <li>• <b>Privacy and Data Protection:</b> Regulations must also address privacy and user data protection. It is important to ensure that data collected by CCAM are used responsibly and in compliance with privacy laws, avoiding discrimination</li> </ul>
Training	<ul style="list-style-type: none"> <li>• <b>Training:</b> Even though vehicles are automated, onboard <b>staff remains a key aspect, to address safety and security for vulnerable groups of users</b>. Regulations should clearly define training requirements for onboard or remote personnel hired at this purpose.</li> </ul>
Level of Services	<ul style="list-style-type: none"> <li>• <b>Permits for Operators:</b> Operators of automated transport services should be required to obtain a permit to operate, and this permit should be <b>conditional on meeting accessibility criteria</b>.</li> </ul>

In general, it is important for policy makers to avoid a "one-size-fits-all" approach and instead adopt an approach that considers a continuous updating of current legislation to social and technological changes. For example, the UK PSVAR, Public Service Vehicles Accessibility Regulations (UK Department of Transport, 2023), provides a good starting point for regulating automated transport. However, these standards may be not fully sufficient and need to be adapted for **vulnerable groups of users**. For example, PSVAR sets requirements for bus ramps, but it does not cover how to ensure accessibility in driverless vehicles.

### Key messages

In summary, **rules and regulations are essential** to ensure that CCAM are **safe, accessible, and acceptable for everyone**. The analysis emphasizes the need to adapt and integrate existing regulations, and develop new CCAM-specific standards, and promote collaboration between public authorities, private operators, and interest groups. In terms of responsibilities, the role of EU and national policy makers are predominant, given that the set-up of harmonised EU rules and regulation can support actors at regional and local level.

## 2.2 Market based instruments

The use of market-based instruments, even if not central as the ones on rules and regulations, can be beneficial to the development of CCAM services, contributing to shape policy recommendations. Some important considerations can be drawn:

- **Sustainable Business Models:** Business models for CCAM must be appealing to potential users. Meta analysis on economic factors influencing the take up of CAAM services shows that it is unlikely that demand for such services may rise in the next years if **willingness to pay (WTP)** for such a service does not increase (Pei Nen Esther Chee, Yusak O. Susilo, Yiik Diew Wong & Anna Pernestål, European Transport Research Review, 2022). The increase of the WTP is linked to the Level of Services (LOS) of CCAM. Better LOS (speed, frequency, amplitude of services, etc) push the user to perceive CCAM as a significant improvement in personal mobility. It is therefore crucial to develop business models that consider both operating costs and consumer willingness to pay: the development of long-term sustainable business models should also be adaptable to changes in demand and technology. To increase users' willingness to pay or pay more for automated minibuses, it is also essential to improve the **temporal and local flexibility** of the services. This suggests that an on-demand service could be more attractive to users compared to fixed routes and schedules. Flexibility is seen as a key factor in the success of automated minibus services.
- **Incentives and Subsidies:** Private operators are interested in business models that maximize profits and minimize costs. However, their willingness to invest may be limited **unless public subsidies or a clear short-to-medium-term profit potential is available**. This highlights the need for public incentives and subsidies to promote CCAM adoption, especially during the initial phases. The role of EU and national projects and programmes, Memorandum of Understanding with economic operators, funding for R&D can play an important role, at all levels (EU, national and local, see *below*, chapter 3).
- **Public-Private Partnerships (PPP)** Public-private partnerships (PPP) could be an effective tool for financing and implementing automated transport services. PPP models can combine public and private sector resources and expertise, while also reducing risks and costs for each party. **Transport authorities should promote PPPs** to encourage private sector participation and the development of innovative solutions. This means fostering a market where various operators and suppliers compete to provide the most efficient and cost-effective solutions for users. Tenders and public procurement processes could be used as market tools to stimulate innovation and cost reduction.
- **Develop evaluation methods as Cost-Benefit Analysis:** A comprehensive cost-benefit analysis is essential to evaluate the economic feasibility of different automated transport models. This analysis should consider both direct costs (e.g., vehicle purchase, infrastructure) and indirect costs (e.g., environmental impact, social benefits). The benefits must be compared to alternative transport options to determine whether an automated transport solution is the most economically advantageous.
- **Pricing Strategies:** Service prices must be competitive compared to alternatives, and it is important to consider different user groups' willingness to pay. Implementing flexible pricing strategies (e.g., off-peak discounts or subscription plans) could help increase usage and make the service more accessible. If a CCAM service has a fare payable (as opposed to a free short-distance shuttle) then the pricing and ticketing should be integrated with the rest of the local public transport network.

- **Added Value:** In economic terms, CCAM services should offer added-value services to attract users. This could include Wi-Fi connectivity, real-time information, or entertainment options.

### Key messages

The analysis of market-based instruments discloses a wide array of instruments and market tools available to policymakers, highlighting the need for an economic approach based **on attractive business models, public incentives, public-private** partnerships, and comprehensive cost-benefit analyses. Service flexibility and added value for users are key elements for enhancing the adoption of CCAM. In terms of accessibility to everyone, it will be important to consider in such a class of instruments the likely lowest WTP of vulnerable groups (elderly, disabled, young). In such a context, the role of R&D programmes, subsidies and funding from EU, national and local authorities is fundamental to overcome low-income barriers, supporting demand at least in the short-term period.

## 2.3 Infrastructure development

Infrastructure development represents an important component in improving the toolbox of policy instruments for the introduction of CCAM services in public transport. The key aspects identified include:

- **Physical Infrastructure:** Existing physical infrastructure is often inadequate to support CCAM services. As consequence, significant investments are required to upgrade and adapt public transport infrastructure. This includes:
  - Well-maintained road surfaces and sidewalks: The quality of road and sidewalk surfaces is essential for accessibility, especially for people with disabilities. Infrastructure must be free of obstacles such as cracks, cobblestones, and undetectable curbs.
  - Clear signage and road markings: Road signs and lane markings must be clear and visible to help CCAM services to navigate safely and efficiently.
  - Accessible bus stops: Bus stops must be fully accessible, including ramps, adequate space for wheelchairs, and information in accessible formats.
  - Charging stations: When electric vehicles are considered in the trip-chain, it is essential to implement a network of accessible charging stations, also tailored to disabled people.
  - Infrastructure adaptations: The infrastructure must be updated to accommodate CCAM features, such as automated ramps that adjust to different stop heights or bus stops designed according to specific standards.
  - Dedicated lanes: Where possible, it is preferable to implement segregated lanes for CCAM services to avoid interactions with pedestrians and mixed traffic, ensuring greater safety and efficiency and a higher commercial speed. It could be that such lanes could be shared with e.g. traditional public transport (buses and coaches) and emergency vehicles, provided the drivers of such authorised vehicles are trained in interacting with connected or automated vehicles.

- **Digital Infrastructure:** Beyond physical infrastructure, it is crucial to develop **digital infrastructure** to support **connectivity and communication** between vehicles, infrastructure, and users. This includes:
  - Reliable communication networks: The availability of 5G, G5, and IoT networks is essential for enabling real-time communication between vehicles, infrastructure, and remote-control centres.
  - Accurate positioning systems: CCAM services may require precise positioning systems, especially in areas where road markings are missing or unclear.
  - High-definition maps: HD maps are necessary for safe and efficient CCAM navigation.
  - Remote control centres: It is useful to have remote monitoring centres to oversee and manage CCAM, especially in emergency situations.
  - Cybersecurity: Digital infrastructure must be protected against cyberattacks to ensure the safety and reliability of the automated transport system.
- **Infrastructure & Accessibility:** Accessibility is a crucial factor and must be considered from the initial design phase of infrastructure development. This includes:
  - Accessibility for people with disabilities: Infrastructure must be designed to be fully inclusive, considering individuals with visual, motor, and cognitive impairments.
  - Use of tactile paving, clear and accessible signage, and audio information for better navigation.
  - Accessible travel information: Travel information should be provided in multiple formats, including digital and printed versions. For visually impaired users, audio or braille information is necessary.
  - Assistance infrastructure: Infrastructure should include features that assist people with disabilities, such as ramps, wheelchair restraints, and rest areas for guide dogs.
- **Planning & Coordination:** the need for a **coordinated and strategic approach** to infrastructure development should be also considered. This includes:
  - Sustainable Urban Mobility Plans (SUMP): These plans should integrate CCAM services to ensure that infrastructure development supports the transition to more sustainable and inclusive transport systems. In countries at the forefront in the development of autonomous vehicles (e.g. Germany) set a framework for adapting infrastructure to new forms of mobility (*Infra*, chapter 3).
  - Common standards & regulations: It is essential to establish standardized regulations to ensure interoperability and safety in automated transport systems.
  - Stakeholder engagement: Public authorities must collaborate with private operators, technology companies, and local communities to develop suitable infrastructure.
  - Holistic approach: Infrastructure development should take a comprehensive approach, considering both AV needs and those of other road users and communities.

- Impact assessment: The impact of infrastructure development on mobility, the environment, and social equity should be carefully evaluated.

In terms of accessibility, it should be stressed that in **rural areas**, where public transport services are often limited, infrastructure is critical to enabling automated mobility solutions. Automation could improve accessibility and connectivity in these areas, but investment in infrastructure is necessary to support these services.

### Key messages

Infrastructure development is a key instrument under the control of policy makers at EU, national and local level, to enable the effective adoption of automated vehicles in public transport. This requires **significant investments, strategic planning, and an inclusive approach** that considers the needs of all users, with a special focus on accessibility, safety, and sustainability. Besides, digital infrastructure is a prerequisite for connectivity, communication, and security in an automated transport system.

## 2.4 Information and awareness

Finally, information and awareness campaigns complement the toolbox for policymakers with a wide array of instruments addressing the engagement of general public and vulnerable users in particular in the introduction of CCAM in public transport. The main points identified are:

- **Raising Awareness**: One of the primary objectives of awareness campaigns is to increase public awareness about automated minibuses and their potential benefits. Many potential users are not fully informed about the existence of these services, their advantages, and how they function. Campaigns should reach a broad audience through various channels, including:
  - Traditional media: Newspapers, radio, and television remain important sources of information for many people.
  - Social media: Social media platforms are becoming increasingly relevant, especially to reach younger and more technology-oriented audiences.
  - Direct engagement: On-site interactions at test locations can effectively raise awareness, as users can experience the technology firsthand.
  - Word-of-mouth: Informal communication through friends and acquaintances can significantly influence public opinion.
  - Informational events: Organizing public events at pilot sites can help introduce the technology to the community.
- **Managing Public Perception**: Awareness campaigns should address public concerns and fears regarding CCAM, including safety, reliability, and employment impact. It is essential to communicate the benefits as well as public concerns. Campaigns should highlight key advantages of AVs, such as:
  - Increased accessibility for people with disabilities.

- Reduced pollution due to cleaner transportation options. It is expected indeed that the introduction of CCAM services in public transport should increase demand, displacing demand for private mobility.
- Greater flexibility in mobility services.
- **Reassure the public:** It is important to build confidence in AV safety and communicate the security measures in place.
- **Address public concerns:** Campaigns must respond clearly and transparently to any doubts or hesitations about AVs.
- **Building Public Trust:** Trust is a key factor in the acceptance of CCAM services. Awareness campaigns can help build trust through:
  - Hands-on demonstrations: Allowing potential users to experience CCAM firsthand can reduce fears and increase confidence in the technology.
  - Transparency: Being transparent about how CCAM services work, their limitations, and potential risks can help the public trust the system.
  - Public involvement: Engaging the public in the design and implementation process of CCAM can foster trust and create a sense of ownership over the project.
  - Targeted communication: Adapting messages to different user groups based on their needs, preferences, and information sources can enhance engagement.
- **Influencing Public Behaviour:** Awareness campaigns can shape public behaviour by encouraging:
  - Increased use of CCAM services: Campaigns can promote CCAM by emphasizing their benefits, ease of use, and convenience.
  - Reduction in private car use: Campaigns can encourage people to transition to more sustainable transport modes, reducing car dependency.
  - Better understanding of CCAM technology: Campaigns can educate the public about how CCAM function, dispel myths, and foster a realistic perception of the technology.
- **Gathering Public Feedback:** Awareness campaigns can also serve as a means to collect public feedback, identify areas for improvement, and adjust policies and services to meet user needs.
  - Using social media: Monitoring social media comments and digital platforms can provide valuable insights into public reactions.
  - Focus groups and surveys: Organizing focus groups and conducting surveys can offer in-depth feedback from different user segments.

## Key messages

Awareness campaigns are an essential tool for policies to **improve the CCAM adoption** in public transport. By **addressing public concerns, providing clear information, and building trust**, awareness efforts can help create an **informed society** that is **ready to embrace automation technology**, while ensuring that **transport services remain safe, accessible, and sustainable**. The establishment of an **advisory panel** composed of people with disabilities is recommended to develop the campaigns. In such a context, the **role of Public Authorities is crucial**. They can fund campaigns, providing financial support to sustain awareness efforts. They can coordinate efforts, conveying messaging consistency and **targeting the right audience**. They can also collaborate with stakeholders, establishing partnerships with **industry operators, tech companies, and user associations**, enhancing in such a way campaigns effectiveness.

### 3. Policies from a sample of EU countries and international experiences

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The indications arising from the analysis of the toolbox of policies available to the policymakers are complemented in this chapter by recommendations drawn from EU and international legislation. In particular:

- **EU National, regional and local legislations**, as collected from the sample of European countries involved in SINFONICA (France, Germany, Greece, Italy, The Netherlands and UK), that made available the related literature and legislative sources on the bases of a common template for data collection (presented in Appendix A).
- **International legislation**, reviewed from a limited sample of countries with different institutional frameworks, e.g. US and China.

Conclusions are drawn at the end of the review, aiming to identify relevant and recurring topics addressing the key challenges to make CCAM available and equitable for all<sup>3</sup>.

#### 3.1 EU National, regional and local legislation

##### France

France has established a legal framework for autonomous vehicles (AVs), aligned with both European and international regulations. The key legislative framework is based on the LOM (Loi d'Orientation des Mobilités, 2019, see Appendix A, France section, line 4 for details) and its updates (see Appendix A). The Decree No. 2021-873 (July 2021) allows AVs to operate without a human driver under predefined conditions, provided they meet safety standards. The French Transport Code has been updated to accommodate AVs, setting out responsibilities for manufacturers, operators, and users.

More in general, the components of the legal framework considered in the current legislation deal with a) authorisations for trials and experiments, b) dispositions on safety requirements, c) liability and insurance issues

##### 1. Tests and trials

Testing and deployment are allowed nationwide, with designated zones for AV operation. The French government supports pilot programs in cities like Paris, Lyon, and Rouen, where AVs are tested under real-world conditions<sup>4</sup>. In 2017, tests were initially set out for four electric ZOE running on 10km of public roads on three routes in Rouen's Madrillet Technopôle business zone with a shuttle bus added later.

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<sup>3</sup> According to the SINFONICA Del 4.1 on the taxonomy and knowledge Map, "User's need CCAM channels to raise attention on relevant issues are related to public transport".

<sup>4</sup> <https://www.connexionfrance.com/news/driverless-cars-head-for-streets-of-rouen/467104>



Run by Renault, public transport firm Transdev and insurers Matmut, the Rouen Normandy Autonomous Lab tests aimed to deal with real-life problems such as busy junctions, aggressive drivers and finding safe parking.

In Lyon, the EU project AVENUE tested a new autonomous shuttle service. Operated via Navya electric driverless vehicles in cooperation with Sytral (transport authority) and Keolis (operator), the open-road experiment has been designed to be fully integrated within Lyon's public transport network<sup>5</sup>.

## 2. Safety Requirements

Concerning safety requirements, AVs must undergo rigorous testing and approval by France's UTAC (Union Technique de l'Automobile, du motorcycle et du Cycle) and relevant agencies. Real-time monitoring systems are mandatory for AVs operating without human intervention. Cybersecurity measures are also enforced to protect against hacking and data breaches.

A fail-safe mechanism must be in place to ensure the vehicle can stop safely in case of system failure. France also aligns with EU General Safety Regulations (GSR) 2022, mandating black-box-type data recorders for accident analysis.

## 3. Liability & Insurance

Operators and manufacturers bear primary liability in case of accidents, shifting responsibility away from the driver (if any). Compulsory insurance for AVs is required, covering damages from system malfunctions. France applies strict product liability rules, meaning manufacturers must prove that any failure was not due to negligence in system design.

Concerning accessibility, AVs must be designed to accommodate people with disabilities, in line with France's Accessibility Act (2005) and EU Accessibility Directive (2019). Regulations encourage AVs to integrate voice-command and haptic feedback systems for visually or physically impaired individuals. Autonomous public transport services (e.g., AV shuttles) must include accessible boarding and communication systems.

In 2024, self-driving shuttles have been deployed in a remote region of southeastern France the shuttle is being tested in a group of towns called Val de Drôme - Crest where the population density is 68 inhabitants per square km, lower than the French average of 106. The shuttles, which have been deployed since 2020, currently use a path of around 5 km with seven stops over 20 minutes with a control operator present to ensure a swift journey.

The shuttles may represent a solution for sparsely populated zones. In the words of the promoters, "We are trying to ensure that this is a new means of travel and mobility for people living in suburban or rural areas,"<sup>6</sup>.

In terms of future developments, France is working on harmonizing its AV regulations with UNECE (United Nations Economic Commission for Europe) standards. More legislative updates are

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<sup>5</sup> <https://www.sustainable-bus.com/its/lyon-gets-an-autonomous-shuttle-service-via-two-navya-vehicles/>

<sup>6</sup> Yann Arnaud, director of responses to customer needs and innovation at the French insurance company MACIF, told Euronews Next on the sidelines of the European Mobility Expo <https://www.euronews.com/next/2024/10/26/this-self-driving-shuttle-transport-people-in-rural-france-is-it-the-future-of-mobility>

expected to enhance ethical AI decision-making and expand AV use cases in logistics and ridesharing.

## Germany

Germany has been at the forefront of legislation on autonomous vehicles, aiming to create a legal framework that encourages innovation while ensuring safety.

In the Autonomous Vehicle Act (see Appendix A, Germany section, line 2), Germany has regulated the operation of vehicles with Level 4 autonomy, as defined by the SAE (Society of Automotive Engineers). Level 4 autonomy refers to vehicles that can operate without human intervention under specific conditions. The law is intended to regulate the technical requirements for the construction, quality and equipment of motor vehicles with autonomous driving functions - as well as the testing and procedure for issuing an operating license for motor vehicles with autonomous driving functions by the Federal Motor Transport Authority (KBA).

The key features are the following (please, refer to the Appendix A).

- **Scope:** The legislation allows Level 4 autonomous vehicles to operate on public roads in specified operational design domains. Examples include shuttle buses, logistics vehicles, and public transport in defined areas.
- **Remote Operation:** The act permits vehicles to be monitored and controlled remotely if necessary. A remote operator must be available to intervene in emergencies or exceptional situations using vehicle sensor and camera data.
- **Approval Process:** Autonomous vehicles must undergo a thorough approval process, including a safety assessment, to receive an operational permit.
- **Safety Requirements:** Vehicles must have robust fail-safe systems to ensure safety in case of technical issues.
- **Data Handling:** Operators must comply with data protection laws (GDPR) and ensure transparency regarding the collection, storage, and use of data.
- **Liability:** The law clarifies liability issues, holding the vehicle owner or operator responsible for damages caused by the AV, even when the vehicle is in autonomous mode.

In addition to the Autonomous Vehicle Act, specifically focussed on autonomous driving, other national laws set the framework for the harmonisation of autonomous driving with two important long-term and strategic topics: 1) digital strategy and 2) accessibility.

On the first topic, three action fields have been defined (1) Connected society, (2), innovative economy, (3) digital state. In such a framework, 19 light house projects have been identified. One of them is the target of having an ecosystem for mobility data. This concerns a migration of the mobility data space and the 'mobilithek'.

On the second topic, the Accessibility Strengthening Act (Barrierefreiheitsstärkungsgesetz), implementing the European regulation on EAA (European Accessibility Act<sup>7</sup>) ensures the

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<sup>7</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019L0882>

accessibility of products and services in the interests of consumers and users, avoiding discriminations. This strengthens the right of people with disabilities to participate in society and takes account of the harmonization of the internal market.

The Act to Strengthen the Participation of People with Disabilities and to Determine the Social Assistance Providers under State Law (TeilhabeStärkungsgesetz) amends the above framework, addressing several different aspects for people with disabilities : a) single points of contact for employers, b) budget for training, c) public sector contracts for facilities with disabled people, d) active job promotion by job centres, e) increase in motor vehicle assistance, f) health apps as medical rehabilitation services, g) carriage of assistance dogs, h) protection against violence, i) group of people entitled to benefits in integration assistance, l) state regulations of the social welfare providers, m) special regulations for minors entitled to benefits, n) Kurzarbeit benefits (state wage subsidies).

Other national laws address technical aspects, like the Regulation on the Registration of Vehicles for Road Traffic (Vehicle Registration Regulation - FZV), which regulates the possibility of teleoperated operation of autonomous vehicles. It is argued that the provisions of the FZV, which declare vehicles with a maximum design speed of less than six km/h to be exempt from registration. This could also be applied by analogy to autonomous vehicles in teleoperated mode if they are limited to walking speed in an emergency.

Besides, the Decree on the regulation of the operation of motor vehicles with automated and autonomous driving function and amending road traffic regulations in 2022 regulates (1) the examination and procedure for issuing an operating license for motor vehicles with autonomous driving functions; (2) the requirements and the detailed procedure for the approval of the defined operating area for the operation of a specific motor vehicle with autonomous driving functions on public roads; (3) supplementary regulations for the registration of the motor vehicle; (4) detailed regulations on the obligations of the parties involved; (5) new testing regulations; (6) administrative offenses and (7) in its annex, detailed technical requirements for the construction, quality and equipment of motor vehicles with autonomous driving functions.

Prior to the 2022 law, the 2017 Road Traffic Act amendment laid the groundwork for testing Level 3 and Level 4 AVs. Under this framework:

- Testing was allowed on public roads with specific safety measures.
- A human driver was required to remain in the vehicle to take over if necessary.

At local level, the Berlin mobility act<sup>8</sup>, though not explicitly mentioning autonomous vehicles, sets the scene for future developments, including the adoptions of further sections on commercial transport and “new mobility” developments.

In a nutshell, Germany occupies a leading international position in dealing with regulative framework for autonomous driving. In such a pivotal activity, the cornerstones of the initiatives address the following areas:

- Human Priority: AVs must prioritize human life over property or other interests.

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<sup>8</sup> <https://www.berlin.de/sen/uvk/en/mobility-and-transport/transport-policy/berlin-mobility-act/>

- Equality: autonomous vehicles decision-making must not discriminate based on age, gender, ethnicity, or other personal characteristics.
- Accountability: Developers and operators must ensure AV decisions are understandable and traceable, specifically as far as safety is concerned.

## Greece

Greece has adopted a structured approach to introducing autonomous vehicles through pilot testing and phased implementation. The legislation defines five testing phases, each with specific requirements and safety measures:

- **Phases 1-3:** During these initial phases, a safety operator is required to be present in the vehicle to monitor operations and intervene if necessary.
- **Phases 4-5:** In these advanced phases, the presence of a safety driver inside the vehicle is no longer mandatory. Instead, a remote operator must monitor the vehicle's operation and be capable of intervening when needed.

The Greece on the move: Sustainable Urban Mobility - Micromobility - Arrangements for the modernization, simplification and digitization of the Ministry of Infrastructure and Transport (see the Appendix A to list legislation sources) provides an example of the application of safety measures to public CCAM.

According to this regulation, an autonomous bus shuttle can run onto a road network in case of a pilot application or experimental/research purposes. It should possess necessary mechanisms and systems which ensure that its movement, braking and stopping behaviour is similar to a human-driven one. Both the shuttles and the network should be constantly monitored via cameras and Control Centres. The interior of the shuttle can also be monitored for safety and security reasons. The person(s) monitoring the AV should possess a driver license equivalent to the "conventional" type of the AV, and each person can monitor up to 4 AV shuttles. An autonomous vehicle carrying up to 3500 kg of cargo can also be given a license, in terms of pilot applications, or research purposes, after relevant official request.

On the technical specification side, the Ministerial Decision 393352/2022 sets rules and technical specifications on driverless driving. The regulation addresses the following topics:

- the General Definitions (Article 1), AV Route (Article 2), Signalling - circulation rules (Article 3), Vehicle traffic monitoring Officer at the Traffic Management- Control Centre - Traffic Monitoring System, (Article 4), Definition and description of trial periods (Article 5), Application of emergency plan (Article 6), Description and characteristics of DS and other technical autonomous driving capabilities of a passenger AV, (Article 7), Maximum weights, dimensions, manoeuvrability, body and equipment of a passenger (Articles 8-10), Necessary documents for submission (Article 11), Conditions for granting license for the trial run, with special provision for granting license for research purposes (Article 13), Duration and validity of licenses (Article 14).

## Italy

Italy lacks a specific and organic legislation on autonomous vehicles. Over the past years, a legal framework to facilitate the testing and eventual deployment of autonomous vehicles has been progressively developing, while ensuring safety and compliance with existing traffic laws.

There are three key areas of activity, basically promoted at national level (see Appendix A to list legislation sources):

1. Legislation on trials and testing
2. Legislation supporting R&D
3. Infrastructure developments

Concerning the legislation on trials and testing, In February 2018, the Italian Ministry of Infrastructure and Transport issued a decree outlining the procedures for testing autonomous vehicles on public roads.

The decree, in essence, is developed along two main lines: (1) the creation of "connected roads", through a series of tools duly listed and defined by the new legislation, and (2) the introduction and experimentation of self-driving car, governed by particularly precise and stringent provisions.

Entities such as vehicle manufacturers, universities, or research institutions must obtain specific prior authorization from the Ministry to conduct tests. The authorization specifies the exact roads and areas where testing is permitted, and it is valid for one year, with the possibility of renewal.

During testing, a driver or supervisor capable of taking immediate control of the vehicle must be present, ensuring manual override if necessary. As of now, consumers are not permitted to operate Level 3 to Level 5 autonomous vehicles on public roads in Italy. The current legal framework only allows for the testing of such vehicles under controlled conditions and with proper authorization.

The first authorization under this decree was granted on May 7, 2019, to VisLab, a spin-off of the University of Parma, allowing the testing of autonomous vehicles in the cities of Turin and Parma.

Concerning the legislation supporting R&D, the Technical Support Observatory for Smart Roads and for the connected and self-driving vehicle was created in 2018 to respond to the growing interest of public and private companies in the potential offered by new digital technologies applied to the automotive and mobility sectors.

The Observatory carries out multiple institutional tasks such as national coordination between the various local initiatives, present and future, in the field of smart road and road experimentation of automated guided vehicles and the promotion and support of studies, research and in-depth studies, with particular attention to the theme of "safety". For its activities, it will be able to avail itself, free of charge, of the collaboration of additional subjects inside and outside the Ministry with proven expertise on specific issues.

On the same line of development, the National law DECRETO-LEGGE 16 luglio 2020, n. 76 introduced further regulatory simplifications to encourage the experimentation of innovative technologies, including self-driving vehicles. The "Sperimentazione Italia" program, launched by the Department for Digital Transformation, is a platform that allows companies to test innovative technologies in various sectors, including autonomous driving, in temporary derogation from regulations. An

example is the experimentation of autonomous shuttles in Turin (project SHOW), which took advantage of this regulatory framework for radical innovations.

A Memorandum of Understanding on innovation for autonomous and connected driving in urban and suburban areas has been established in May 2020 between the Minister for Technological Innovation and Digitalisation and the Minister for Infrastructure and Transport, May 2020. The protocol aims to develop and support applied research, experimentation and prototyping, production and training of new professionals in the field of innovative self-driving and connected vehicles and means of transport, as well as the interest in creating services with social impact for the country.

Another instrument to support R&D is funding. The MaaS for Italy project, promoted by the Ministry of Sustainable Infrastructure and Mobility (MIMS), is facilitating the testing of autonomous mobility technologies in cities such as Milan, Naples, Rome, and Turin, among others. This project promotes the integration of digital services and platforms to improve the accessibility of public transport, including autonomous vehicles, through collaboration between multiple operators.

Incentives for the purposes referred to the State Budget National law 27 December 2017, n. 205, allocated the expenditure of one million euros for each of the years 2018 and 2019 to autonomous vehicle trails.

At local level, regional projects (e.g. “MaaS4Piemonte”) provide contributions towards the adaptation of the Italian legislation to the introduction of autonomous vehicles; for example, the Italian Highway Code does not yet allow the full use of autonomous vehicles, which is why the Piedmont Region is calling for adequate regulatory intervention to allow a gradual introduction of autonomous driving experimentation.

Concerning infrastructure, it is worthwhile to mention the technical report template preparatory to the Smart Road sticker request, 22/10/2024 (Technical support observatory for Smart Roads and for the connected and self-driving vehicle) from the Ministry Transport and Infrastructure. The guideline describes in detail the digital transformation process carried out on the road infrastructure aimed at the introduction of traffic observation and monitoring platforms, data and information processing models and advanced services for infrastructure managers. The guidelines for the creation of a technological ecosystem are conducive to interoperability between infrastructures and new generation vehicles.

In summary, while Italy has established procedures for the testing of autonomous vehicles, the use of such vehicles by consumers on public roads is not yet permitted. The country is actively working towards developing comprehensive regulations to support the safe and effective integration of autonomous vehicles into its transportation system. Italy is expected to continue refining its legal framework to accommodate advancements in autonomous driving technology. This includes potential legislative interventions to address aspects such as vehicle homologation, data management, and the integration of smart road infrastructure.

Italy currently applies its general liability regime to autonomous vehicles, as there is no specific liability rules tailored for autonomous vehicles. This means that, in the event of an accident involving an autonomous vehicle, the existing laws governing road traffic liability are applicable.

The operation of autonomous vehicles involves the collection and processing of significant amounts of data. While specific regulations concerning data generated by autonomous vehicles are still under development, Italy adheres to the European Union's General Data Protection Regulation (GDPR), ensuring that data privacy and protection standards are maintained.

### The Netherlands

In the Netherlands, a governmental document from the Minister of Infrastructure issued in 2024 has informed the Dutch Parliament that in 2025 there will be a proposal for a legislation oriented to give autonomous vehicles permission to be tested and driven on public roads. The deadline for this to happen is 2027. At the moment, autonomous vehicles can only be tested on private terrain.

The communication to Parliament provides more information about the state of affairs regarding vehicle automation. This includes both ADS (Driver Assistance Systems) and advanced driving task support through driver assistance systems (advanced driver assistance systems, ADAS). These systems are already permitted in the Netherlands to drive on public roads, and support the driver, for example, braking, accelerating and steering.

Concerning the legislation on tests and trials of CCAM, in order to benefit from a great boost in trials on public roads a change in the law would be necessary, i.e. the process of amending the Road Traffic Act issued in 1994.

It is expected that in 2025 the procedure can start, including also consultation on the Internet to improve participation. The internet consultation will contain a summary of the type of policies to be implemented, publishing the documents as attachments when the proposal is presented to Parliament.

The next legislative steps are expected to raise awareness in the preparation of society for the arrival of automated vehicles (as specified in February 2024 communication to Parliament) identifying promising applications, such as automated public transport and freight transport, and discussing the implications for the involved organizations and transport operators.

This includes potential legislative interventions to address aspects such as vehicle homologation, data management, and the integration of smart road infrastructure.

In summary, the Netherlands are going to establish a comprehensive legal framework that facilitates the testing and gradual deployment of autonomous vehicles. By implementing phased testing, stringent safety measures, and data recording requirements, the country is going to integrate autonomous vehicles into its transportation system, on the basis of the experimental Use of Self-Driving Vehicles Act (2019)<sup>9</sup>. Effective from July 1, 2019, this law allows companies to apply for permits to conduct tests with driverless vehicles on public roads. Notably, it permits testing without a physical driver present in the vehicle, provided a human operator can remotely take control if necessary.

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<sup>9</sup><https://www.government.nl/topics/mobility-public-transport-and-road-safety/self-driving-vehicles>

## United Kingdom

Despite that the UK does not yet have a standalone, comprehensive AV law, similar to the German case, it has anyway taken significant steps through amendments to existing legislation, consultations, and frameworks designed to integrate autonomous technologies.

In terms of regulatory framework, the most relevant reference is to the Automated Vehicles Act (2024, see the Appendix A to list legislation sources). This foundational law provides the legal basis for insurance and liability related to autonomous vehicles. It ensures:

- **Insurance Coverage:** All autonomous vehicles must have insurance that covers damages caused when the vehicle operates in automated mode.
- **Liability:** If an autonomous vehicle causes an accident while in automated mode, the insurer (or owner, in specific cases) is held responsible. Manufacturers may be liable if a defect in the vehicle software causes harm.
- **Data Recording:** Vehicles must record sufficient data to establish whether they were in automated mode at the time of an incident.
- **Highway Code Amendments (2022):** Updates were made to prepare for AV integration, including rules for safe handover between drivers and automated systems.

With reference to test and trialling, see in Appendix A, Code of Practice: Automated Vehicles Testing<sup>10</sup>, the UK legislation supports cooperation between trialling organisations and those responsible for traffic management infrastructure, law enforcement, increasing sharing of information.

For example, through testing initiatives like Zenzic, a government-backed organization coordinating testing across connected and autonomous vehicle (CAV) hubs. In general, trials of autonomous vehicles on public roads are permitted under strict safety guidelines and require pre-approval by the Department for Transport (DfT).

The equality Act (2010), similarly to the German case, Defines protected characteristics which should be subject to non-discrimination: Age, Sex, Disability, Race, Religion / Belief, Marriage Status, Gender reassignment, Sexual Orientation. Public Sector Duty requires public sector bodies to aim to reduce discrimination.

Concerning safety and ethical considerations, in 2022, the Law Commission of England and Wales and the Scottish Law Commission published a joint report proposing reforms for autonomous vehicles specific legislation<sup>11</sup>. Their key recommendations include:

- **New Legal Actor:** Introducing the concept of an Authorised Self-Driving Entity (ASDE), which would be responsible for ensuring the safety of an AV's systems and software.
- **Driver Responsibility:** Differentiating between a vehicle user (who only monitors operations) and a driver (who actively controls the vehicle).
- **Ethical Design:** AVs must follow clear ethical principles, prioritizing human life and safety.

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<sup>10</sup> <https://www.gov.uk/government/publications/trialling-automated-vehicle-technologies-in-public/code-of-practice-automated-vehicle-trialling>

<sup>11</sup> <https://lawcom.gov.uk/project/automated-vehicles/>

The UK government has committed to creating a comprehensive legal framework for autonomous vehicles by 2025. Key areas of focus include:

- Road Safety: Ensuring AVs meet rigorous safety standards.
- Cybersecurity: Protecting AVs from cyber threats.
- Infrastructure: Developing digital and physical infrastructure to support AV deployment.
- Public Confidence: Building trust in AV systems through transparency and accountability.

In June 2023, the government released a draft document outlining steps toward establishing a long-term regulatory framework for AVs, with an emphasis on safety and innovation<sup>12</sup>.

### 3.2 International legislation

The international situation on CCAM legislation varies widely across non-European countries. An important factor explaining different approaches relies on the institutional framework. At the extremes, countries with a decentralised approach, like US, set general federal guidelines, leaving the implementation at national level, while countries with a structured (governmental-driven) approach, like in China, result in the allocation of permits to test and develop CCAM in specific areas.

#### United States

The U.S. has a decentralized approach, with federal guidelines complemented by state-level regulations.

At the federal level, the National Highway Traffic Safety Administration – NHTSA - (2016), issued the “Federal Automated Vehicles Policy” and updates, a Guidance document focusing on safety assessments and voluntary guidance.

In monitoring the development of automated vehicles, the National Highway Traffic Safety Administration requests that manufacturers submit a Safety Assessment to NHTSA’s Office of the Chief Counsel for each automated vehicle system, outlining how they are meeting the Guidance document at the time they intend their product to be ready for use (testing or deployment) on public roads.

This Safety Assessment would assist NHTSA, and the public, in evaluating how safety is being addressed by manufacturers and other entities developing and testing systems.

At State level, each state regulates testing and deployment differently: California requires permits for autonomous vehicles testing and deployment, including disengagement reporting, Arizona allows extensive testing with fewer restrictions, attracting many autonomous vehicles companies. Florida permits driverless vehicle operation without a safety operator.

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<sup>12</sup> <https://www.gov.uk/government/publications/automated-vehicles-bill-2023>

## China

China has a structured and government-driven approach to autonomous vehicle legislation.

In 2018, the Ministry of Transport, the Ministry of Public Security (MPS) and the Ministry of Industry and Information Technology (MIIT) released national guidelines for road testing of autonomous vehicles<sup>13</sup>.

The legislation sets out criteria for the qualification of operators like Baidu and AutoX to get permits for fully driverless operations in select areas.

The independent legal entity registered in the territory of the People's Republic of China should:

(ii) Possessing relevant business capabilities of intelligent connected vehicles such as automobile and parts manufacturing, technology research and development or testing and inspection.

(iii) Having sufficient civil compensation capacity for personal and property losses that may be caused during the testing of intelligent connected vehicles.

(iv) Having test and evaluation procedures for the automatic driving functions of intelligent connected vehicles.

(v) Having the ability to remotely monitor the test vehicle in real time.

(vi) Having the ability to record, analyse and reproduce test vehicle events.

(vii) Other conditions stipulated by laws, regulations and rules.

Other proceedings, e.g. the Article 8 sets the rules to identify the relevant competent departments of provincial and municipal governments that shall select several typical sections of roads within their jurisdiction for road testing of intelligent connected vehicles and announce them to the public.

The testing entity shall submit a road test application to the relevant competent departments of provincial and municipal governments where the test section is to be conducted. The application materials shall include at least:

(i) Basic information of the test subject, test driver and test vehicle,

(ii) For domestic motor vehicles, the factory certificate of the motor vehicle shall be provided, but for those that are not included in the announcement model, the factory certificate and the mandatory inspection report of the corresponding model issued by a third-party testing laboratory recognized by the state shall be provided; for imported motor vehicles, the mandatory product certification certificate of imported motor vehicles, the vehicle inspection form and the cargo import certificate shall be provided;

(iii) Description of the automatic driving function and proof that it does not reduce the safety performance of the vehicle.

(iv) Certificate of motor vehicle safety technical inspection.

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<sup>13</sup> <https://stip.oecd.org/stip/interactive-dashboards/policy-initiatives/2023%2Fdata%2FpolicyInitiatives%2F26849>

(v) Proof of the actual vehicle test conducted by the test subject in a specific area such as a closed road or site.

(vi) Entrusted inspection report of the automatic driving function issued by a third-party testing agency engaged in automobile-related business recognized by the state or province.

(vii) Test plan, including test section, test time, test items, test procedures, risk analysis and response measures.

(viii) Traffic accident liability compulsory insurance certificate, and traffic accident liability insurance certificate of no less than RMB 5 million per vehicle or letter of guarantee for compensation for road test accidents of no less than RMB 5 million for autonomous driving.

The relevant competent departments of provincial and municipal governments are responsible for organizing the acceptance and review of test applications and issuing intelligent networked vehicle road test notices for each approved test vehicle, and regularly reporting to the Ministry of Industry and Information Technology, the Ministry of Public Security and the Ministry of Transport for filing and publicizing.

The test notice shall indicate the test subject, vehicle identification code, name and ID number of the test driver, test time, test section and other information. Among them, the test time shall not exceed 18 months in principle.

In a nutshell, it can be noted that the government-driven approach tries to address in a unique legislation all the issues concerning trials and implementation of CCAM.

In harmonisation with the 2018 legislative act, local governments issue permits for testing, with Beijing, Shanghai, and Shenzhen being key hubs.

### 3.3 Conclusions on the review of some EU Member States and international legislation on CCAM

From reviewing the EU and international legislation on CCAM, several recurring themes and challenges emerge. These can be grouped into five key categories, which also may show interrelations and overlapping issues, e.g. safety and ethical considerations: 1) safety, 2) liability, 3) ethical considerations, 4) cybersecurity, and 5) accessibility.

- 1) **Safety and technical standards.** Harmonization of safety regulations is a priority, and despite national variations persist, the EU legislation in the sample of countries under examination is on the way to define common standards and binding rules. Autonomous vehicles must indeed include safety mechanisms and options for human supervision. In France, the key legislative framework is based on the LOM (Loi d'Orientation des Mobilités, 2019) and further modifications, allowing CCAM to operate without a human driver under predefined conditions, provided they meet safety standards. In Germany, the Autonomous Vehicle Act (2022) aims at creating a legal framework that encourages innovation while ensuring safety. In general, test requirements vary widely from an international perspective, with the EU applying more stringent validation than China or the United States. **Policy challenges in this domain include the need for CCAM to include fail-safe mechanisms and human oversight options, particularly for Level 3 and Level 4 autonomy and when vulnerable groups of users are involved.**

- 2) **Liability and insurance.** There is a shift from driver to manufacturer/operator liability in the event of accidents with autonomous vehicles. Some jurisdictions (UK, Germany) require separate insurance policies for autonomous vehicles, but Italy currently applies its general liability regime to autonomous vehicles, as there are no specific liability rules tailored for autonomous vehicles. In UK, in terms of regulatory framework, the most relevant reference is the Automated Vehicles Act (2024). This foundational law provides the legal basis for insurance and liability related to autonomous vehicles. It ensures that all autonomous vehicles have insurance coverage rules that cover damages caused when the vehicle operates in automated mode. In Germany, The Autonomous Vehicle Act Liability law clarifies liability issues, holding the vehicle owner or operator responsible for damages caused by the AV, even when the vehicle is in autonomous mode. Manufacturers may be liable if a defect in the vehicle software causes harm. **Challenges in this topic concern a lack in harmonised rules at EU level and fault in complex scenarios, particularly when multiple entities (software developers, hardware manufacturers, CCAM owners) are involved.**
- 3) **Ethical and legal considerations.** Some regulatory frameworks (such as Germany's Ethical Guidelines for autonomous vehicles) prohibit autonomous vehicles from making choices based on individual characteristics (e.g. age, gender). Concerns are growing about data privacy, especially under the EU's GDPR, which regulates how autonomous vehicles process and store user data, which differ from US. **This area's key challenge is related to the difficulties in defining global ethical frameworks that guide AI-driven decision-making in emergencies. The review on the matter (Schäffner, V., 2024) stresses the need for further research and intensifying systematic investigations in ethics of risk in autonomous vehicles.**
- 4) **Cybersecurity and data protection:** autonomous vehicles rely heavily on artificial intelligence, cloud connectivity and V2X (Vehicle-to-Everything) communication, making them vulnerable to cyberattacks. EU legislation is progressing; cybersecurity measures are also enforced to protect against hacking and data breaches. In France, mandatory black-box-type recorders for accident analysis are required, to align with the EU General Safety Regulations (GSR) 2022<sup>14</sup>. **Key challenges concern with the lack of harmonisation: internationally, standards differ, the U.S. focuses on industry-led security practices, while China enforces strict data localization rules for autonomous vehicles. Besides, there are reasons to believe that preventing cyberattacks could compromise autonomous vehicles operation and ensuring secure over-the-air updates.**
- 5) **Accessibility and inclusion:** Mandatory accessibility features (voice control, haptic feedback, step-free access) are being integrated into CCAM design. The French Loi d'Orientation des Mobilités (LOM, 2019) allowing the circulation of fully automated vehicles especially public transport, to be suitable for people with disabilities. **The key policy challenge in this topic is to ensure private CCAM manufacturers to prioritize accessibility beyond government-mandated public transport projects, through a tailored CCAM design to vulnerable groups of users.**

In conclusion, the review shows that despite legislation is evolving in the direction of embedding CCAM related regulations, inconsistencies still exist between different international regulatory frameworks (EU, USA, China). A global standardization is needed, especially in safety testing, liability rules and cybersecurity. Also, ethical decision-making remains controversial, as always happens when AI is involved, requiring further legal and maybe philosophical debate.

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<sup>14</sup> <https://eur-lex.europa.eu/eli/reg/2019/2144/oj/eng>

In Europe, accessibility rules are improving, but enforcement mechanisms need strengthening to ensure compliance, e.g. agreement with manufacturers for CCAM design.

From a policy perspective, the accessibility topic obviously plays an important role in the context of SINFONICA objectives, but it would be a limitation if policy recommendations from this project would consider accessibility in isolation, without an overarching view embracing the other topics.

What indeed seems to emerge from the review is that pursuing a better CCAM accessibility for vulnerable groups of users implies the formulation of recommendations connected to other topics as well. For example, safety, legal & liabilities rules, that although addressed in general with reference to autonomous vehicles, have to be adapted to vulnerable users' specific needs.

### Key messages

For now, the sample of EU countries shows two main trends: 1) integration of autonomous vehicles in the national Road Code, specifying conditions to run trials and demonstrations according to national safety standards. 2) Dispositions for funding R&D in the sector, fostering research and trials on automated vehicles and promoting Memorandum of Understanding with industries and research institutes.

**What is still needed is a more decisive step towards the consideration of vulnerable groups of user's needs. Requirements on how to design and adapt CCAM services serving the purpose of more inclusivity are lacking in the EU legislation on the matter as well as targeted communication and awareness strategies.**

## 4. Policies from a sample of EU projects and SINFONICA Workshops

### 4.1 EU projects

As previous SINFONICA Deliverables have shown (SINFONICA, 2023), the knowledge base of EU projects funding CCAM trials and analysis is substantial. For a comprehensive overview, the platform Connected and Automated Driving (CAD)<sup>15</sup> stands as an excellent repository consolidating knowledge and experiences related to Cooperative, Connected and Automated Mobility in Europe and worldwide.

From this platform, seven CCAM projects have been identified and reviewed in terms of policy recommendations for uptake and development of CCAM services. Criteria for the identification come from the object of the projects: the selected projects dealt with autonomous buses, providing tests and pilots in several European cities involving automated mini-buses and autonomous shuttles, with a particular emphasis on the problems arising from the integration of the new automated services in the public transport network. Other fields of interest are the provision of such new services in low-demand areas and the factors affecting users' acceptability.

The review has been carried out looking in particular at the policy recommendations formulated in the projects. Sometimes, the projects dealt with strategic issues, preparing the future public transport systems to accommodate for automated solutions. In such a case, the focus was both on technical solutions and future mobility planning challenges.

The group of 7 projects dealing with autonomous buses and shared services are the following:

- solutions and integration of autonomous buses in public transport network (CATAPULT, SOHJOA BALTIC),
- automated shared solutions (SHOW),
- pilots on new concepts of automated buses (FABULOS, L3PILOT),
- mini-buses (AVENUE) and
- integration of shuttle-bus in public transport (RIDE2AUTONOMY).

Table 2 summarises the list of policy recommendations derived from the selected EU projects focussed on development and trials of automated shared public services, articulated in three key types of actors involved: a) cities and regional authorities, b) Public Transport Authorities (PTAs) and Operators (PTOs), c) national/European governments.

*Table 2: Policy recommendations from EU projects*

National/European governments	Public Transport Authorities (PTAs) and Operators (PTOs)	Cities and regional authorities
<ol style="list-style-type: none"> <li>1. Public authorities should establish a <b>harmonized and systematic framework</b> for approving automated vehicles.</li> <li>2. <b>Recommendations</b> should be created for international and national policymakers after the</li> </ol>	<ol style="list-style-type: none"> <li>1. Ensure <b>accessibility</b>, especially when the new service replaces an existing one, with extra care taken not to deny service to current users, including people with disabilities.</li> </ol>	<ol style="list-style-type: none"> <li>1. Cities and public authorities should <b>define use cases</b> and features of automated shuttles, with suppliers developing technical capabilities accordingly.</li> <li>2. Cities should offer potential use cases for <b>testing automated</b></li> </ol>

<sup>15</sup> <https://www.connectedautomateddriving.eu/projects/>

National/European governments	Public Transport Authorities (PTAs) and Operators (PTOs)	Cities and regional authorities
<p>problems/gaps in the legal frameworks are analyzed.</p> <p>3. Encouragement and funding <b>further research</b> to implement short and long-term solutions <b>and best practices</b> for purpose limitation and data minimization.</p>	<p>2. Operational services must meet <b>basic requirements</b> set by local public transport authorities regarding service quality, including reliability, passenger capacity, and accessibility.</p> <p>3. Local and regional authorities and PT organizations should build their knowledge regarding the <b>costs of running shared CCAM</b> services and balance the expectations</p> <p>4. <b>Develop technical capabilities</b> in line with the use cases and features defined by cities.</p>	<p><b>shuttle fleets in real operational environments</b> to support development by understanding current technological limitations</p> <p>3. Public authorities need to take an active role in the <b>rollout of automated vehicles</b> to meet policy objectives, such as limiting single car occupancy through road pricing and parking management, and by making shared fleet tendering or concessions for automated minibuses.</p> <p>4. Cities should consider how automated shuttle implementation <b>supports city strategies</b>, particularly for sustainability, setting targets for emission reduction.</p> <p>5. The <b>integration of CCAM services in the urban PT network</b> should be planned and incorporated into the general mobility planning framework of Sustainable Urban Mobility Plans (SUMP). Local and regional authorities.</p>

The analysis of the policy recommendations allows the definition of a clear attribution of responsibilities across the key actors involved in the development and take-up of CCAM services.

**For national/European governments:** They are responsible, on the one hand, for establishing the harmonized and systematic framework for approving CCAM vehicles, supporting local authorities in creating political goals or motivations to lay the foundations for automated shared public services. On the other hand, they can play a fundamental role in funding and promoting research & development with industries and PTOs.

**For Public Transport Authorities (PTAs) and Operators (PTOs):** They are responsible for CCAM operational services to be efficient and effective. CCAM services must meet the basic requirements set by local PTAs regarding service quality, including reliability, passenger capacity and accessibility for people with vulnerabilities.

**For cities and regional/local authorities:** Local authorities should define use cases and features for automated shuttles, accordingly, guiding the development of technical capabilities by PTOs and PTAs. Cities should also offer potential use cases to test automated shuttle fleets in real operational environments, supporting development through understanding current technological limitations. The CCAM services integration into strategic plan, as Sustainable Urban Mobility Planning (SUMP) and into local infrastructure (public transport network) should strengthen the importance of CCAM services into the local mobility.

Synergy and collaboration among the key actors should result in a policy framework conducive to the development of CCAM services, by i) encouraging further research to implement short- and



long-term solutions and best practices, ii) providing recommendations for international and national policymakers after analysing the problems/gaps in legal frameworks, iii) defining which types of data could and should be considered high value in the context of automated vehicles and therefore kept free and open, in dialogue with manufacturers and implementers of automated vehicles, as well as with third parties interested in the data, iv) guiding and supporting the creation of high-quality and high-value data infrastructure resources, in full compliance with personal data privacy legislation.

## 4.2 Contribution of the SINFONICA Workshops to policy recommendations

During the lifetime of SINFONICA, Workshops have been held to involve stakeholders dealing with the provision and design of CCAM services, both on the supply and demand side (i.e. vulnerable groups of people).

A milestone event in such a context, has been the Workshop on policy recommendations, held in Birmingham on September 9th, 2024, involving the SINFONICA Groups of Interests (Gols). In SINFONICA, the Gols are specific working groups involving CCAM users and stakeholders emerged around four realities: the cities of Trikala and Hamburg, the province of Noord-Brabant, and the metropolitan area of West Midlands.

### SINFONICA Workshop on September 9th, 2024 in Birmingham

The Workshop “Shaping User-Centric Recommendations for CCAM” aimed to gather stakeholders’ perspectives to inform the drafting of the report “Vision policy recommendations for user centric CCAM”.

During the Workshop, preliminary recommendations from policy makers in Trikala, Hamburg, Noord Brabant and West Midland were discussed. These recommendations resulted from an intense consultation activity with local stakeholders and user groups carried out in each municipality/region involved.

#### Key policy suggestions from Trikala (GR)

Trikala is a small city, with a large rural area and faces unique mobility challenges due to its dispersed population. With circa 50,000 car owners out of 80.000 inhabitants, car dependency is high. This has a negative impact on the environment, due to severe traffic congestion in the city centre, and social effects. People who cannot afford or do not own a car cannot commute to the city centre and therefore cannot access essential services such as healthcare facilities and supermarkets.

In such a context, which policies could help CCAM services to flourish?

The policy recommendations from Trikala focus on the **combination of standards and regulation to enhance safety and reduce human errors**, particularly concerning persons with reduced mobility. They also advocate for policies that **improve accessibility**, working on better infrastructure and interoperability to eliminate barriers for people with reduced mobility.

Besides, the policy recommendations highlight the need to **address affordability**, through a sustainable balance between quality of CCAM services and their costs. The issue of CCAM cost turned out to be relevant, **in particular in a small city**. The potential limitation of the provision of

CCAM services in a small city may arise from barriers both on the demand side (affordability) and supply side (population dispersion).

The recommendations stress the role of regional and national authorities to overcome these barriers, with a particular focus on infrastructure investment. Policies of **monitoring and control** are also advocated to this purpose.

### **Key policy suggestions from Hamburg (DE)**

The size of the city of Hamburg, the second largest city in Germany with almost 2 million inhabitants, makes a difference with the experience of Trikala. With several suburban trains, four train stations for long-distance traffic, and several ferries to cross the river Elbe, the city of Hamburg presents the typical transport context of a big European city, with high population density and complex network. Besides, several CCAM-activities are under way: test track for autonomous driving (TAVF), autonomous suburban train, and projects for autonomous vehicles integration into public transport.

The policy recommendations for a better social inclusion in CCAM services are the following:

Policies aiming at favouring a **better integration with traditional transport services** play an important role, not only from a technical point of view, i.e. supporting integration and interoperability at interchanges and stations, but also for combining traditional transport modes with CCAM services effectively. The **Hamburg experience teaches that technology alone may not fully address the needs of people with reduced mobility.**

In such a context, policies for **standard and regulations in designing information tools** and digital devices for booking should be implemented to improve the accessibility for people with reduced mobility. Besides, **awareness and information campaigns** are necessary to improve the transparency of information about sensitive topics (e.g. safety, privacy) in CCAM service provision. This is particularly true in case of safety and security for women using CCAM.

More in general, the experience of Hamburg points out the challenge of balancing the integration of CCAM services with the traditional transport versus developing CCAM as an alternative to traditional services. The policy recommendations in Hamburg lean towards supporting the **integration of CCAM with traditional transport**, focusing on enhancing the overall user experience and addressing human factors.

### **Key policy suggestions from Noord Brabant Province (NL)**

In contrast to the small city of Trikala, and the large city of Hamburg, Noord Brabant has a distinct institutional profile: it is a Province, with a broad jurisdiction.

The Province includes 56 municipalities and serves a population of approximately 2,5 million inhabitants. Noord Brabant features a diverse range of social and economic characteristics: it includes major economic and innovation hubs such as the Brainport Region and the Delta Rhine Corridor, alongside rural areas like De Peel, Kempen en Meierij, and big cities including Eindhoven, Tilburg, Breda, and Den Bosch.

The policy recommendations for inclusive CCAM focus on the following topics:

The Noord Brabant policy recommendations reflect the composition of the vulnerable people involved in the consultation: particularly people living in rural areas and small villages with limited

access to public transport, as well as migrants who may face language barriers and are generally less familiar with public transport systems.

To address these challenges, policies recommendations emphasise the importance of providing clear information and user-friendly digital booking systems to **meet the needs of those who may be digitally illiterate, migrants or people facing language barriers.**

As a Province, Noord Brabant's policies inherently involve municipalities and stakeholders (e.g. transport operators) in the policy definition stage. For CCAM services targeting vulnerable users, the Province **endorses public consultations at municipal level** with people with disabilities, to influence policies and solutions in the sector.

Other policy recommendations address **safety and accessibility**. These areas are closely linked, as pursuing safety for vulnerable people (both at technical level by designing comfortable buses and at social level by providing travel assistance in person) may significantly improve accessibility to CCAM services for these people.

### **Key policy suggestions from West Midland Region (UK)**

The institutional context of West Midland Region is similar to Noord Brabant as both are large-scale administrative bodies. West Midland involves 7 Boroughs, corresponding to 2.9 million inhabitants. Its social and economic characteristics also mirrors Noord Brabant's, featuring large cities as Birmingham, Coventry and Wolverhampton and alongside several rural areas.

The consultation for CCAM services in the West Midlands involved two key user groups. People with physical disabilities reported on the accessibility challenges they face using traditional public transport, while people with low income informed of their financial challenges in using traditional services.

The policy recommendations for inclusive CCAM resulting from the SINFONICA Goals focussed on the following topics:

The recommendations envisaged by the Region focus on **the affordability issue**. First, there is a focus on ensuring the **sustainability** of these services. This involves justifying the substantial investments in infrastructure and equipment by demonstrating that they will result in innovative and valuable transport solutions that benefit taxpayers. Second, the recommendations emphasize making **CCAM services accessible to everyone**, considering physical, financial, and operational aspects of accessibility.

In addition to affordability, accessibility is further addressed through two specific recommendations. The first suggests **incorporating personal safety into the design of buses and vehicles**, developing standards and rules to enhance safety features. The second recommendation focuses on **road safety in infrastructure design**, advocating for segregated road spaces for CCAM services to reduce the risk of collisions with traditional vehicles.

Another policy recommendation concerns **awareness and information campaigns** targeting car users. What could shift their demand from cars to CCAM services? The awareness of better environmental performances of CCAM services may play a role in shifting the demand from private cars to public CCAM services.

The summary of policy recommendations reflects the priorities of SINFONICA policymakers. These priorities are highlighted by the frequency with which specific recommendations have been mentioned as relevant. Table 3 shows the results.

Table 3: Policy recommendations from SINFONICA Gols

WHAT – Policy Domain	HOW – Type of Policy
<p><b>Safety and standards</b></p> <ul style="list-style-type: none"> <li>- Trikala: Develop and implement standards for the safe deployment of CCAM systems.</li> <li>- Hamburg: Implement standards for the safe deployment of CCAM systems.</li> <li>- Noord-Brabant: Ensure users can stay in contact with a person if needed.</li> <li>- West Midlands: Integrate safety considerations into transport system design.</li> </ul>	<p><b>Standard/Regulation: Safety Design (Road Design, Bus Design)</b></p> <p><b>Purpose:</b> Establishing regulations for road and vehicle design to ensure safety, including travel assistance if needed.</p>
<p><b>Accessibility and inclusivity</b></p> <ul style="list-style-type: none"> <li>- Trikala: Create policies that ensure accessibility and barrier-free transport.</li> <li>- Hamburg: Ensure transport services are barrier-free and accessible to all.</li> <li>- Noord-Brabant: Meet accessibility requirements for public transport.</li> <li>- West Midlands: Ensure accessibility across physical, financial, and operational dimensions.</li> </ul>	<p><b>Standard/Regulation: Barrier-Free Services (e.g., Digital Booking System for Digitally Illiterate)</b></p> <p><b>Purpose:</b> Implementing regulations to ensure digital services are accessible to all users, including those who are digitally illiterate.</p> <p><b>Taxes/Subsidies: Financial Support</b></p> <p><b>Purpose:</b> Providing financial support to make services affordable, including subsidies or tax incentives for users or service providers.</p>
<p><b>Environmental and sustainability goals</b></p> <ul style="list-style-type: none"> <li>- Trikala: Align initiatives with environmental goals to reduce emissions.</li> <li>- Hamburg: Align CCAM initiatives with sustainability goals to reduce emissions.</li> <li>- West Midlands: Consider both sustainability and cost factors in service design.</li> <li>- West Midlands: Ensure CCAM has strong green credentials to encourage use.</li> </ul>	<p><b>Standard/Regulation: CCAM “Green” Emission Standards</b></p> <p><b>Purpose:</b> Setting emission standards for CCAM systems to align with environmental sustainability goals.</p>
<p><b>Infrastructure and investment</b></p> <ul style="list-style-type: none"> <li>- Trikala: Invest in infrastructure to support CCAM integration.</li> <li>- Hamburg: Support CCAM integration with necessary infrastructure.</li> <li>- West Midlands: Provide designated or segregated lanes for CCAM vehicles.</li> </ul>	<p><b>Grants/Loans: Setting Up Infrastructure Integration (Interchanges/Stops) and Design (Barrier-Free)</b></p> <p><b>Purpose:</b> Providing financial assistance for the development and integration of infrastructure that supports barrier-free and efficient CCAM systems</p>
<p><b>Information and user experience</b></p> <ul style="list-style-type: none"> <li>- Noord-Brabant: Provide clear and comprehensive information to users.</li> </ul>	<p><b>Information Campaigns: Information Provision</b></p> <p><b>Purpose:</b> Enhancing the dissemination of clear and comprehensive information to users through public awareness and education campaigns.</p>

WHAT – Policy Domain	HOW – Type of Policy
- Noord-Brabant: Design a digital booking system that is simple for all users.	
<b>Evaluation and monitoring</b> - Trikala: Continuously gather feedback and adjust policies to balance quality and cost. - Hamburg: Monitor and adjust CCAM services based on feedback and cost considerations.	<b>Command and Control: Monitoring of Users’ Feedback</b> <b>Purpose:</b> Implementing systems to continuously monitor user feedback and adjust policies or services accordingly. <b>Command and Control: Definition of Right Timing of Implementation</b> <b>Purpose:</b> Establishing guidelines for the timing and phased implementation of CCAM systems to ensure effective integration and performance.

**Not surprisingly, the policies improving safety and inclusions are considered as a priority.** In particular, safety should be addressed by policies adapting infrastructure and vehicles to the needs of people with reduced mobility. Inclusivity, on the other hand, should result from a package of policies ranging from information and awareness campaigns to proper investment in infrastructure tools, and financial support to low-income persons.

In light of the insights arising from SINFONICA, other considerations may improve the picture of policy recommendations for equitable and inclusive CCAM. Namely:

1. **Appropriate scale for managing CCAM services:** Determining whether local or regional scales are more suitable for managing CCAM services effectively.
2. **Limitations from local situations:** Identifying any limitations or specific challenges arising from the SINFONICA Go! local contexts that might impact the implementation of policies.
3. **Policy conclusions based on different perspectives:**
  - **Public Authority Perspective:** Assessing the ability of public authorities to provide additional services and support.
  - **Operator Perspective:** Considering how operators might benefit from offering more services and reduced operating costs in the absence of drivers.
  - **User Perspective:** Evaluating the impact of policies on various types of users, including those with special needs and different socioeconomic backgrounds.

As follow up of the Workshop in Birmingham, other feedback from different types of stakeholders (external to the SINFONICA project) were collected. Namely:

- A) feedback from the CCAM Platform, Cluster 6 Societal aspects and people needs
- B) feedback from operators working with disability (In Italy, at Pontevico)
- C) feedback from the Workshop held in ARUP premises (Birmingham) on Research Insights into an Autonomous Future, on October 29<sup>th</sup> 2024.

### A) Feedback from the CCAM Platform

Through communication with Ingrid Skogsmo, leader of the CCAM Platform Cluster 6 on Societal aspects and people needs, it was stressed as it was interesting to note that many of the recommendations emerging from the Birmingham Workshop raised issues and topics irrespective if they were CCAM-specific: for example, major interoperability and infrastructure investment.

A tentative approach in identifying what could be of interest in the development of specific CCAM policies is the following:

- Ensure users can stay in contact with a person if needed.
- The issue of travel assistance.
- Implementing regulations to ensure digital services are accessible to all users, including those who are digitally illiterate.
- Ensure CCAM has strong green credentials to encourage use.

### B) Feedback from operators working with disability in Pontevico (BR) on 19<sup>th</sup> October 2024

On October 19, 2024, the Municipality of Pontevico, 7,000 inhabitants in the province of Brescia (IT) promoted a Workshop between the coordinator of the SINFONICA project and a panel of citizens (volunteers in the field of disability, operators in territorial disability assistance facilities, educators). The aim was to collect suggestions and opinions on the role of self-driving vehicles in supporting mobility for people with disabilities and on the most appropriate policies to promote their development.

The Workshop represented an important opportunity to listen to the opinions of those who work daily in contact with people with disabilities. Citizens' views on the priorities of public policies to bring people with disabilities closer to the use of self-driving vehicles can be grouped into three main categories:

1. **Policies to promote accessibility and inclusiveness must be accompanied by policies addressing safety & security.** Certainly, policies giving importance to accessibility and inclusiveness are important, but it is also true that in order to make them realistic and operational, there must be attention to safety. People with disabilities feel safety issues as a priority, in particular “where they have to feel safe, and they have to know that their safety is not at risk”.
2. **The role of infrastructure.** The elimination of architectural barriers is a necessary condition for bringing people with disabilities closer to new forms of mobility.
3. **The role of information and education.** Information desks on which people with disabilities who need to learn more about travel or other, can go to ask for information. Because sometimes digital sources of information are not enough, and if it's okay that you can put everything on the Internet, on social media, it is not certain that people with disabilities will be able to find this information. A person may need physical counter, and especially at the initial stage of new technologies, there is a need for someone who tells you "this is the means" and therefore it is really a guide to the future. The Municipality in the first place, perhaps also through dedicated desks or network of associations, can be the institutional figure closest to the people, involving in that the territorial network of entities that already deal with fragility.

4. **Differentiate disabilities into homogeneous categories**, in terms of needs and usability requirements, in order to understand which ones can actually use autonomous vehicles and at which conditions.

### C) Feedback from the Workshop held in ARUP premises (Birmingham) on Research Insights into an Autonomous Future, on 29<sup>th</sup> October 2024

The Workshop discussed the study “Investigating the potential and merits of Connected and Automated Mobility in public transport”<sup>16</sup>, issued by ARUP (2022) engaging 13 regional/local policy practitioners from across the UK.

Over 85% of participants in the engagement sessions indicated that they believed their authorities have a very important, indispensable or crucial role to play in the deployment of CAM for public transport. In particular, central government will play a key role in setting the direction of CAM implementation and prioritising adoption in public transport.

In terms of policy conclusions, an important topic in the Workshop held in Pontevico, was safety. Studies have indeed shown that one of the strongest deterrents for vulnerable persons choosing public transport is the lack of safety.

The ARUP study has pointed out that early engagement, education and demonstrations can help to improve public perceptions of safety.

#### Other SINFONICA Workshops on policy recommendations

Two other SINFONICA Workshops were held in early 2025 to address policy recommendations from different but complementary angles, the first one in January basically focused on indications from public transport operators, the second one in February dealing with more general recommendations in terms of service operations and information to the public and users.

A brief account of both Workshops policy conclusions’ follows in the next sections.

#### Feedback from the Workshop held in Noord Brabant, Den Bosch, on 28<sup>th</sup> January 2025

The Workshop in Den Bosh (Noord Brabant, The Netherlands) was held in the Dutch language, having an audience of local stakeholders, with the participation of the Move2CCAM EU project.

Policy recommendations focused on three actors:

1. Public Transport operators
  2. Municipality (with a specific emphasis on Road Authorities)
  3. Technological providers (App & Communication)
- **Public transport operators.** Public transport operators need indications and a clear framework for CCAM services from the client (the Transport Authorities): which conditions for delivering the CCAM services, and more in general a consistent program of requirements for a bus concession, i.e. the obligations that the public transport operator must comply with in the concession area with regard to the public transport authority. This aspect therefore

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<sup>16</sup> <https://www.arup.com/globalassets/downloads/insights/r/research-insights-into-an-autonomous-future.pdf>

requires clarity and flexibility regarding the obligations that the authority imposes on the operator with regard to the introduction of CCAM services. Another important policy issue concerns staffing and personnel policy. It is believed that CCAM services impose new functions. Staffing on CCAM is going to play an important role, because services for vulnerable users (i.e. ensuring assistance and safety) will require dedicated personnel, onboard or remotely, with significant implications on the cost side for operators. The role of local government may play a fundamental role in such a context, supporting training and recruiting. In view of CCAM services, other implications for transport operators concern travel information, e.g. the need to have updated information in case of traffic diversions or accidents, booking, i.e. vulnerable users should have also access to non-digital options when booking trips and enforcement. All these aspects should be considered by the transport authorities in terms of service concessions.

- **Municipalities (Road authorities):** Policy implications for infrastructure managers are manifolds. Road authorities need clear agreements per concession area on the organization of self-driving public transport services, with the concession grantor as the director. Funding for infrastructural adjustments are also needed (road markings, signage, separate bus lanes, clear indications in road layout between pedestrians, cars, self-driving public transport and mixed zones, so that road users know which vehicles can drive around etc.). There is then the important component of raising public awareness through targeted communication, which needs to be addressed through guides and Workshops for orienting transport users to CCAM services. Finally, the implications for mobility strategy should be considered: CCAM services should displace demand from cars and not from cycling and walking, and equity of CCAM services should be considered, ensuring a consistent policy regarding the affordability of public transport.
- **Apps & Communication.** This aspect is of particular importance when the presence of vulnerable groups of users is at stake. They need indeed additional care and attention: what should you do if your device fails? What should you do if you have problems during the journey? Presence of backup is necessary: what should a vulnerable user do if the network/internet fails? There must always be a 'human' available as a helpline (by telephone). In general payment must also be possible without an app, for example with a debit card and communication should be delivered in multiple languages at B2-level. All these aspects make the use of Apps & Communication more complex and demanding.

### Feedback from the Workshop held in Brussels on 14<sup>th</sup> February 2025

The Workshop held on February 14<sup>th</sup>, 2025, at the ERTICO premises in Brussels involved stakeholders from municipalities (city of Helmond) and associations. Recommendations were provided on operational aspects of CCAM (vehicle operations) and on communication strategies engaging users and general public.

- **Operational aspects of CCAM:** recommendations were provided about how to make CCAM services convenient and profitable for users and operators, in the specific demand segment of short-range services integrated to public transport. Service requirements as frequency, speed, real-time route information, role of staff and accessibility were considered fundamental to attract demand, for all type of users (including those with vulnerabilities). The issue of raising the willingness to pay for CCAM services has been discussed in parallel

to the CCAM Level of Services, considered as the key domain to increase their added value. In terms of policy prescription, urban policy makers have stressed the novelty of such services and their unpredictable impacts on travel behaviour, e.g. reducing cycling and walking in youth, in principle more apt to use CCAM services. Concerning users with vulnerabilities, policies reinforcing their level of confidence are considered the most appropriate instrument to improve the perception of safety and security.

- **Recommendations for users and general public:** users, and more specifically users with vulnerabilities, need clear indications and assistance in case of disruption of service, rerouting, etc. This asks for qualified staffing, both onboard and remotely, which can represent an additional cost component for operators. There is room for policy initiatives, in order to reverse the negative impacts on the occupational side arising from CCAM services, e.g. less demand of drivers. Training staff for CCAM services could represent an opportunity for public transport operators and local/national authorities to play an active role in recruiting (retirement and volunteers) and professional training. Similar dynamics in terms of disclosing market opportunities could arise from the development of Apps and communication devices for vulnerable users of CCAM services, in which policy makers could channel funding and programmes.

## 5. Drawing conclusions on policy recommendations

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This chapter draws conclusions in terms of policy recommendations for more equitable and inclusive CCAM services. In doing that, for a better understanding of recommendations, it is important to stress which types of CCAM services we are considering, i.e. the provision of public shared CCAM services, with a specific attention to the inclusion of vulnerable groups of users (elderly, children, persons with disabilities) or others with (potential) mobility challenges. In such a context, the CCAM services considered mainly relate to short-range trips (first-last mile) connected to traditional public transport services. This means that the policy recommendations provided in this Deliverable, if applied to the overall world of autonomous mobility, may sound as not comprehensive. For example, the important theme of Automated Driving Assistance Systems (ADAS) and their relationship with human interaction is not touched here, being related to private automated mobility.

The policy recommendations provided in this report rely on different sources, which allow to consider various perspectives, each one contributing from its specific point of view to the formulation of recommended policies. Namely:

- **Literature review on policy instruments:** this perspective allows to identify the most important instruments in an ideal policy toolbox, which may assist policy makers and stakeholders in policy implementation. Instruments like laws, decrees, partnerships with operators, memorandum of understanding, grants and support of R&D, information campaigns and co-creation activities are to be considered and tailored to the needs of vulnerable groups of users.
- **Review of EU and international legislation:** this perspective sheds lights on recent trends in the legislation on CCAM services and more in general on autonomous vehicles, as emerged from a sample of EU countries and international experiences. It provides a picture of what has been done and what might still be done in terms of more equitable and inclusive CCAM services.
- **Review of policy recommendations from EU project on CCAM:** drawing on the work done in previous SINFONICA Deliverables<sup>17</sup>, this angle provides an overview of policy recommendations based on a sample of EU projects dealing with trials, demonstrations and analysis on public shared CCAM services in Europe.
- **Insights from SINFONICA Workshops on policy recommendation:** this perspective involves aspirations, needs and requirements from users (vulnerable groups) as collected and analysed by the SINFONICA GOIs, in association with stakeholders (operators, policy makers, research and academia).

The logic of the analysis follows a top-down approach: starting from the higher levels, political science and legislative frameworks, and progressively narrow down the analysis to applicative projects and dialogue with users and stakeholders. But the logic of intervention should be reversed: starting with a bottom-up approach, i.e. from user's need, and progressively feeding policy prescriptions at higher level (local, national, European and international).

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<sup>17</sup> Deliverable 5.1 "Equity practices and social indicators", 2023

In order to specify the recommendations, Table 4 shows the What, Who and When components of key policy categories, in which the What is related to the type of policy instruments, correlated to the Who dimension (which type of actors is in charge for that) and When (an indicative dichotomy between short and long term in terms of likely implementation of the policy is assumed, denoting as “short term” a period until five years, and as “long term” a longer period).

Table 4: Policy recommendations for equitable and inclusive CCAM

Policy domains	WHAT	WHO	WHEN
Rules and regulations	<ul style="list-style-type: none"> <li>Safety and liability standards</li> <li>Privacy and data protection</li> <li>Ethical issues</li> </ul>	Policy makers at EU and national level	Long-term
	<ul style="list-style-type: none"> <li>Vehicle design and standards for vulnerable users</li> <li>Infrastructure Interoperability</li> <li>Public Service Obligations for vulnerable groups</li> </ul>	Policy makers at EU and national level Transport Authorities, Operators and manufacturers Transport Authorities and Operators	Short-term
<p><b>Recommendations:</b> in the short-term, the provision of user-centric CCAM services would benefit from harmonised rules for establishing regulations for road and vehicle design to ensure safety, including travel assistance if needed, to people with mobility challenges. Operators, vehicle manufacturers and policy makers should work on that, each one according to specific competences. In the short-term, it is also important to set clear rules in the direction of major flexibility regarding the obligations that the authority imposes on transport operators about the introduction of CCAM services for people with mobility challenges. In the long term, the review of EU legislation has showed that a harmonised and rigorous approach is lacking concerning standards and protocols for CCAM to minimize the risk of accidents, safety and security, including cybersecurity for people with mobility challenges (e.g. safeguarding privacy for data concerning disabilities). This gap also concerns with ethical issues (e.g. difficulties in defining global ethical frameworks that guide AI-driven decision-making in emergencies).</p>			
Policy domains	WHAT	WHO	WHEN
Market-based instruments	<ul style="list-style-type: none"> <li>Incentive &amp; subsidies</li> <li>MoU, Public Private Partnerships</li> <li>R&amp;D programmes</li> </ul>	Policy makers at EU, national and local level, Transport Authorities, Operators, manufacturers	Short-term
	<ul style="list-style-type: none"> <li>Sustainable business models</li> </ul>	Operators	Long-term
<p><b>Recommendations:</b> in the short-term, private operators are interested in business models that maximize profits and minimize costs. However, their willingness to invest may be limited unless public subsidies or a clear short-to-medium-term profit potential is available. This highlights the need for public incentives and subsidies to promote CCAM adoption, especially during the initial phases. The role of EU and national projects and programmes, Memorandum of Understanding with economic operators, funding for R&amp;D can play an important role. As the EU legislation shows, e.g. the German case there are several areas in which State or local financial can support services for people with mobility challenges: a) budget for training, c) public sector contracts for facilities with disabled people, d) active job promotion by job centres, e) increase in motor vehicle assistance, f) health apps as medical rehabilitation services, g) carriage of assistance dogs, h) protection against violence, etc. In the long term, the appropriate use of market-based instruments can support the establishment of sustainable business models for operators.</p>			
Policy domains	WHAT	WHO	WHEN
	<ul style="list-style-type: none"> <li>Accessibility (physical infrastructure)</li> <li>CCAM integration in urban network</li> </ul>	Local and national policy makers, infrastructure	Short-term

Infrastructure development	<ul style="list-style-type: none"> <li>• Planning &amp; coordination (SUMP, local and national strategies)</li> <li>• Set up of Digital infrastructure</li> </ul>	managers, Vulnerable groups of users' associations, operators	Long-term
<p><b>Recommendations:</b> in the short-term, transport infrastructure should be designed to accommodate people with mobility challenges needs. This is particularly true with reference to the crucial issue of the integration of CCAM services with the traditional or standard public transport services. (i.e. last-first mile integration). This may involve creating dedicated lanes, implementing smart traffic management systems, and ensuring compatibility with existing infrastructure. This also requires actions for policy makers in terms of infrastructure integration and development in strategic urban planning (e.g., SUMP) and development of the necessary components for making interoperability possible, e.g. at nodes and interchanges. In the long-term also the issue of digital infrastructure plays an important role. Digital infrastructure should be implemented to improve the accessibility for people with mobility challenges to CCAM services, including those who may be digitally illiterate, migrants or people facing language barriers.</p>			
Policy domains	WHAT	WHO	WHEN
Information and communication	<ul style="list-style-type: none"> <li>• Awareness campaigns</li> <li>• Information campaigns</li> <li>• Use cases and trials</li> </ul>	Local and national policy makers, Vulnerable groups of users' associations, Transport authorities and operators	Short-term
<p><b>Recommendations:</b> SINFONICA activities have shown the importance in the short-term of awareness campaigns and communications, in particular for people with mobility challenges. By addressing public concerns, providing clear information, and building trust, awareness efforts can help create an informed society that is ready to embrace automation technology, while ensuring that transport services remain safe, accessible, and sustainable. The establishment of an advisory panel composed of people with mobility challenges is recommended to develop the campaigns. In such a context, the role of Public Authorities and operators is crucial. They can fund campaigns, providing financial support to sustain awareness efforts. They can coordinate efforts, conveying messaging consistency and targeting the right audience. They can also collaborate with stakeholders, establishing partnerships with industry operators, tech companies, and user associations, enhancing in such a way campaigns effectiveness.</p>			

This set of policy recommendations discloses a vision of user-centric CCAM underpinning an ideal roadmap to more inclusive and equitable services, depicted as follows:

In the short term:

- Definition of design and requirements for including vulnerable groups of users in terms of accessibility to vehicle and infrastructure.
- Supporting CCAM services operators and users through public service obligations addressing flexibility, staffing requirements and subsidies.
- Launching campaigns for raising public awareness, information and discussion on CCAM services, limitations and benefits, involving associations of vulnerable groups of users.
- Planning & integration of CCAM services in public transport and mobility strategies at urban level.

In the longer terms:

- Establishing a common framework on liability & responsibilities in case of accident, privacy, cybersecurity and ethical issues.
- Definition of sustainable business models, including the assessment of willingness to pay for CCAM services, Level of Service and Cost-Benefit analysis.

- Set up of appropriate digital infrastructure, in the direction of smart cities (enhancing V2V and V2I communication) and development of apps tailored to vulnerable groups of users.

## 6. Conclusions on future research needs

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The following future research needs merge from the analysis of policy recommendations:

- **How to transform automated mobility into a set of integrated services?** The integration of CCAM services in the urban fabric of public transport services is an issue. More use cases and trials demonstrating that integration is feasible and desirable are needed.
- **Which business model could be established?** Testing and evaluating different business models in different pilot sites and (urban) traffic environments is needed.
- **Could CCAM services led to undesirable behaviours**, for example diverting cycling and walking instead of trips by car, in particular for young generations, most likely to be interested in automated mobility services?
- **How to reconcile ethical concerns** with the requirements enshrined in privacy protection laws for the collection of personal data?
- Furthermore, regulatory frameworks are needed that must continue to adapt to accommodate the nuances and challenges associated with the distribution of CCAM public transport systems, ensuring a balance between innovation and safety.
- The harmonization of rules and the exchange of experiences, know-how and best practices should also include innovative business models, exploitation plans and collaboration schemes, as well as the creation of a case-sensitive roadmap based on specific guidelines and targeted recommendations

There is then a class of challenges to consider, linked to the technological development:

- Digital infrastructure: Developing software (and hardware) platforms for the remote control of autonomous or robotic systems and vehicles, 5G network as an enabling technology, real-time sensor data, AI-assisted human-machine communication, remote control room.
- Developing easy and intuitive remote management systems and interfaces for vulnerable groups of users to use while being reliable and robust enough to provide the necessary functionality and security.

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## 8. Appendix A: European legislation

### 9.1 France

#### National Regulatory framework on CCAM

Country: France

Nr	Name of Policy	Type of policy (National regulation or Act, National standard, Regional/Local law, Guidance, Code of practice, Industry de facto standard, etc.)	Key terms	Main points	Governmental level (national/federal, regional, local, etc.)	EU legal basis?	Status (Effective, proposed, under consultation, etc.)
1	Order No. 2016-1057 of August 3, 2016 relating to the experimentation of vehicles with driving delegation on public roads	Act		Allows the government to authorize experimentations of automated vehicles on public roads	National		Effective

Nr	Name of Policy	Type of policy (National regulation or Act, National standard, Regional/Local law, Guidance, Code of practice, Industry de facto standard, etc.)	Key terms	Main points	Governmental level (national/federal, regional, local, etc.)	EU legal basis?	Status (Effective, proposed, under consultation, etc.)
2	Decree No. 2018-211 of March 28, 2018 relating to the experimentation of vehicles with driving delegation on public roads	Act		Specifies the process allowing to obtain authorizations to experiment automated vehicles	National		Effective
3	Order of April 17, 2018 relating to the experimentation of vehicles with driving delegation on public roads	Act		Further specifies the necessary requirements for authorizing experimentations of automated vehicles	National		Effective
4	Law for Mobility Orientation (Loi d'orientation des mobilités) published on 24th December 2019 (Article 31)	Law	Base legislative framework CCAM related policies and decisions on the national level"	The overall law is related to the national policy towards mobility. Article 31 focuses on automated vehicles, allowing the government to emit regulations, on traffic laws for instance, related to autonomous vehicles. The article also allows the state to impose the providing of appropriate information or	National	2016/679, 2018/858, 2006/123/CE, 2015/1535/UE,	Effective

Nr	Name of Policy	Type of policy (National regulation or Act, National standard, Regional/Local law, Guidance, Code of practice, Industry de facto standard, etc.)	Key terms	Main points	Governmental level (national/federal, regional, local, etc.)	EU legal basis?	Status (Effective, proposed, under consultation, etc.)
				training prior to selling or renting an autonomous vehicle.			
5	Order No. 2021-443 of April 14, 2021 relating to the criminal liability regime applicable in the event of the circulation of a vehicle with delegation of driving and its conditions of use	Act	criminal liability in case of incidents involving automated vehicles	This order specifies the legal and criminal responsibilities in events involving autonomous vehicles	National		Effective
6	Decree No. 2021-873 of June 29, 2021 implementing Ordinance No. 2021-443 of April 14, 2021 relating to the criminal liability regime applicable in the event of the circulation of a vehicle with delegation of driving and its conditions of use	Decree		Puts the order above into application	National	2006/123/CE, 2015/1535/UE,	Effective

Nr	Name of Policy	Type of policy (National regulation or Act, National standard, Regional/Local law, Guidance, Code of practice, Industry de facto standard, etc.)	Key terms	Main points	Governmental level (national/federal, regional, local, etc.)	EU legal basis?	Status (Effective, proposed, under consultation, etc.)
7	Order of August 2, 2022 implementing Article R. 3152-3 of the Transport Code relating to the authorization of remote operators in the context of automated road transport systems	Act		Allows remote CCAM vehicle operators and defines responsibilities in this case	National		Effective
8	Order of December 8, 2022 establishing the content and methods of providing mandatory information relating to the conditions of use of the automated driving system equipping a vehicle	Act		Specifies the type of information and training that should be provided to users of automated vehicles	National		Effective
9	Order No. 2021-442 of April 14, 2021 relating to access to vehicle data	Act		Defines the entities that can access data generated by vehicles	National	2016/679, 2002/58/CE, 2015/1535	Effective
10	Decree No. 2023-644 of July 20, 2023 relating to access to	Decree		Further specifies the access to vehicle-generated data	National	2016/679, 2018/858,	Effective

Nr	Name of Policy	Type of policy (National regulation or Act, National standard, Regional/Local law, Guidance, Code of practice, Industry de facto standard, etc.)	Key terms	Main points	Governmental level (national/federal, regional, local, etc.)	EU legal basis?	Status (Effective, proposed, under consultation, etc.)
	certain vehicle data for accident prevention and improvement of intervention in the event of an accident, knowledge and mapping of road infrastructure and its equipment and knowledge of road traffic					2002/58/CE, 2015/1535/UE, 2010/40/UE	

Links

1. <https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000032966695/>
2. <https://www.legifrance.gouv.fr/loda/id/JORFTEXT000036750342/2023-10-17/>
3. <https://www.legifrance.gouv.fr/loda/id/JORFTEXT000036868691/>
4. <https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000039666574>
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9. <https://www.legifrance.gouv.fr/codes/id/LEGISCTA000043371612/2021-04-16>
10. <https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000047867363>

## 9.2 Germany

Nr	Name of Policy	Type of policy	Key terms	Main points	Governmental level	EU legal basis?	Status
1	Decree on the regulation of the operation of motor vehicles with automated and autonomous driving function and amending road traffic regulations (Autonome-Fahrzeuge-Genehmigungs-und-Betriebs-Verordnung AFGBV)	National Act	national legal framework for autonomous driving	(1) the examination and procedure for issuing an operating license for motor vehicles with autonomous driving functions; (2) the requirements and the detailed procedure for the approval of the defined operating area for the operation of a specific motor vehicle with autonomous driving functions on public roads; (3) supplementary regulations for the registration of the motor vehicle; (4) detailed regulations on the obligations of the parties involved; (5) new testing regulations; (6) administrative offenses and (7) in its annex, detailed technical requirements for the construction, quality and equipment of motor vehicles	National	Yes, 2022/1426	Effective

Nr	Name of Policy	Type of policy	Key terms	Main points	Governmental level	EU legal basis?	Status
				with autonomous driving functions.			
2	Law for autonomous driving	National Law	national legal framework for autonomous driving	The law is intended to regulate the technical requirements for the construction, quality and equipment of motor vehicles with autonomous driving functions - as well as the testing and procedure for issuing an operating license for motor vehicles with autonomous driving functions by the Federal Motor Transport Authority (KBA). The handling of the data required for operation will also be regulated. The term "technical supervisor" is also defined. According to the Federal Government, this must be a natural person who can deactivate or enable driving manoeuvres of the vehicle with an autonomous driving function from outside	National	Yes, 2022/1426	Effective

Nr	Name of Policy	Type of policy	Key terms	Main points	Governmental level	EU legal basis?	Status
				in individual cases. The technical supervisor is required to take out liability insurance			
3	Digital strategy	Guidance	formulation of political focus of the government under the topic 'digitalisation'	Defined three action fields: (1) Connected society, (2), innovative economy, (3) digital state. Includes 19 light house projects, one of them is the target of having an ecosystem for mobility data. This concerns a migration of the mobility data space and the 'mobilithek'	National	No	Effective
4	Accessibility Strengthening Act (Barrierefreiheitsstärkungsgesetz)	National Law	Implementation of the European regulation on EAA (European Accessibility Act)	The purpose of this law is to ensure the accessibility of products and services in the interests of consumers and users in accordance with the following provisions. This strengthens the right of people with disabilities to participate in society and takes account of the harmonization of the internal market.	National	Yes, 2019/882	Effective

Nr	Name of Policy	Type of policy	Key terms	Main points	Governmental level	EU legal basis?	Status
5	Decree on the accessibility requirements for products and services according to the Accessibility Strengthening Act	National Act	Implementation of the European regulation on EAA (European Accessibility Act)		National	Yes, 2019/882	Effective
6	Berlin mobility act	Regional law	Promoting safe, sustainable traffic in Berlin (capital of Germany)	Act, which prescribes measures to prioritize bicycles and public transport over cars in Berlin's transport planning in future. The purpose of the law is to preserve and further develop a safe, barrier-free transport system that is geared towards the mobility needs of the city and surrounding areas and is designed to be urban, environmentally, socially and climate-friendly. The law combines a general section with fundamental provisions against the regulatory discrimination of public transport, walking and cycling as well as specific sections regulating the requirements for public transport (formerly	Regional	No	Effective

Nr	Name of Policy	Type of policy	Key terms	Main points	Governmental level	EU legal basis?	Status
				the Public Transport Act), cycling and walking. The law should be supplemented with further sections from the outset, at least with a section on commercial transport and “new mobility”.			
7	Act to Strengthen the Participation of People with Disabilities and to Determine the Social Assistance Providers under State Law (TeilhabeStärkungsgesetz)	National Act	Article law amending regulations in various existing laws	Covers several different aspects for people with disabilities. Single points of contact for employers, Budget for training, Public sector contracts for facilities with disabled people, Active job promotion by job centres, Increase in motor vehicle assistance, Health apps as medical rehabilitation services, Carriage of assistance dogs, Protection against violence, Group of people entitled to benefits in integration assistance, State regulations of the social welfare providers, Special regulations for minors entitled to benefits,	National	No?	Effective

Nr	Name of Policy	Type of policy	Key terms	Main points	Governmental level	EU legal basis?	Status
				Kurzarbeit benefits (state wage subsidies)			
8	Straßenverkehrs-Zulassungs Ordnung (StVZO) (National legal requirements for licensing regulations for cars)	National Law	National legal requirements for licensing regulations for cars	All requirements for cars that are licensed in Germany are listed.	National	No	Effective
9	Bundesdatenschutzgesetz (National data protection law)	National Law	National data protection law	General framework for data protection in Germany	National	Yes	Effective
10	Luftsicherheitsgesetz (National air security law)	National Law	National air security law	Would be relevant for air bound CCAM vehicles.	National	Yes	Effective
11	Gesetz über die Pflichtversicherung für Kraftfahrzeughalter (Pflichtversicherungsgesetz)	National Law	National law on compulsory insurance for motor vehicle owners	Law states the mandatory insurance requirements for owners of a vehicle. These would have to change with the introduction of CCAM vehicles.	National	Yes	Effective
12	Personenbeförderungsgesetz (PBefG) (National law on requirements for transporting passengers)	National Law	National law on requirements for transporting passengers	The law would regulate the requirements and prerequisites for transporting people. CCAMs would need to fulfil these.	National	Yes	Effective
13	Verordnung über die Zulassung von Fahrzeugen zum Straßenverkehr (Fahrzeug-Zulassungsverordnung - FZV) [Regulation on the Registration of Vehicles for Road Traffic (Vehicle Registration Regulation - FZV)]	National Law	Regulation on the Registration of Vehicles for Road Traffic (Vehicle	The FZV is mentioned in connection with the possibility of teleoperated operation of autonomous vehicles. It is argued that the	National	Yes	Effective

Nr	Name of Policy	Type of policy	Key terms	Main points	Governmental level	EU legal basis?	Status
			Registration Regulation (FZV)	provisions of the FZV, which declare vehicles with a maximum design speed of less than six km/h to be exempt from registration. This could also be applied by analogy to autonomous vehicles in teleoperated mode if they are limited to walking speed in an emergency.			

#### Links

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14. [https://digitalstrategie-deutschland.de/static/fcf23bbf9736d543d02b79ccad34b729/Digitalstrategie\\_Aktualisierung\\_25.04.2023.pdf](https://digitalstrategie-deutschland.de/static/fcf23bbf9736d543d02b79ccad34b729/Digitalstrategie_Aktualisierung_25.04.2023.pdf)
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17. <https://www.berlin.de/sen/uvk/en/mobility-and-transport/transport-policy/berlin-mobility-act/>
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20. <https://www.gesetze-im-internet.de/luftsig/>
21. <https://www.gesetze-im-internet.de/pflvg/BJNR102130965.html>
22. <https://www.gesetze-im-internet.de/pbefg/BJNR002410961.html>
23. [https://www.gesetze-im-internet.de/fzv\\_2023/BJNR0C70B0023.html](https://www.gesetze-im-internet.de/fzv_2023/BJNR0C70B0023.html)

Nr	Name of Policy	Type of policy	Key terms	Main points	Governmental level	EU legal basis?	Status
1	Documents, terms, conditions and procedure for putting a passenger vehicle into circulation without the presence of a driver on it.	Ministerial Decision 393352/2022	Technical specifications, driverless guide	General Definitions (Article 1), AV Route (Article 2), Signalling - circulation rules (Article 3), Vehicle traffic monitoring Officer at the Traffic Management- Control Centre - Traffic Monitoring System, (Article 4), Definition and description of trial periods (Article 5), Application of emergency plan (Article 6), Description and characteristics of DS and other technical autonomous driving capabilities of a passenger AV, (Article 7), Maximum weights, dimensions, manoeuvrability, body and equipment of a passenger (Articles 8-10), Necessary documents for submission (Article 11), Conditions for granting license for the trial run, with special provision for granting license for research purposes (Article 13), Duration and validity of licenses (Article 14)	National Law	Yes	Effective
2	Greece on the move: Sustainable Urban Mobility - Micromobility - Arrangements for the modernization, simplification and digitization	Law 4784/2021, Part D, Chapter A, Article 42	Autonomous bus, technical specifications	An autonomous bus shuttle can run onto a road network in case of a pilot application or experimental/research purposes. It should possess necessary mechanisms and systems which ensure that its movement, braking and stopping behaviour is similar to a human-driven one. Both the shuttles and the network should be constantly monitored via cameras and Control Centres. The interior of the shuttle can also be monitored for safety and security reasons. The	National Law	Yes	Effective

Nr	Name of Policy	Type of policy	Key terms	Main points	Governmental level	EU legal basis?	Status
	of the Ministry of Infrastructure and Transport			person(s) monitoring the AV should possess a driver license equivalent to the "conventional" type of the AV, and each person can monitor up to 4 AV shuttles. An autonomous vehicle carrying up to 3500 kg of cargo can also be given a license, in terms of pilot applications, or research purposes, after relevant official request.			

Nr	Name of Policy	Type of policy	Key terms	Main points	Governmental level	EU legal basis?	Status
1	Implementation methods and operational tools for on-road testing of Smart Road and connected and automatic driving solutions	Ministerial Decree 70/2018	1)'Supervisor' means the occupant of the vehicle, who must always be able to take control of the vehicle regardless of the degree of automation of the the same, at any time the need arises by acting on the vehicle controls in absolute advance automated systems and is therefore responsible for the of vehicle circulation. 2) Testing on public roads of vehicles with automatic driving is authorized by the Ministry of Infra Facilities and Transport - Department for Transport, Navigation, General Affairs and Personnel - Directorate General for motorization	The decree, in essence, is developed along two main lines: (1) the creation of "connected roads", through a series of tools duly listed and defined by the new legislation, and (2) the introduction and experimentation of self-driving car, governed by particularly precise and stringent provisions.	National	Yes	Effective
2	Set up of the Technical Support Observatory for Smart Roads and for the connected and self-driving (art. 20 Decreto Ministero)	Technical support to trials (2018)	1) Technical documentation for trials 2) Events, Workshops 3) Promotion of feasibility studies	The Technical Support Observatory for Smart Roads and for the connected and self-driving vehicle was created in 2018 to respond to the growing interest of public and private companies in the potential offered by new digital technologies applied to the automotive and mobility sectors. The Observatory carries out multiple institutional tasks	National	No	Effective

Nr	Name of Policy	Type of policy	Key terms	Main points	Governmental level	EU legal basis?	Status
	Infrastrutture e trasporti 70/2018)			such as national coordination between the various local initiatives, present and future, in the field of smart road and road experimentation of automated guided vehicles and the promotion and support of studies, research and in-depth studies, with particular attention to the theme of "safety". For its activities, it will be able to avail itself, free of charge, of the collaboration of additional subjects inside and outside the Ministry with proven expertise on specific issues.			
3	Urgent measures for simplification and digital innovation	National law DECRETO- LEGGE 16 luglio 2020, n. 76.	Measures, projects and incentives to accelerate the transition to a sustainable and intelligent mobility, with particular reference to projects aimed at promoting the advent of mobility multimodal automated and connected, capable of reducing pollution and the extent of pollutant emissions, and through the development of intelligent management systems made possible by digitalisation.	This decree introduced further regulatory simplifications to encourage the experimentation of innovative technologies, including self-driving vehicles. The "Sperimentazione Italia" program, launched by the Department for Digital Transformation, is a platform that allows companies to test innovative technologies in various sectors, including autonomous driving, in temporary derogation from regulations. An example is the experimentation of autonomous shuttles in Turin (project SHOW), which	National	No	Effective

Nr	Name of Policy	Type of policy	Key terms	Main points	Governmental level	EU legal basis?	Status
				took advantage of this regulatory framework for radical innovations			
4	Memorandum of Understanding (MoU) on innovation for autonomous and connected driving in urban and suburban areas	MoU between the Minister for Technological Innovation and Digitalisation and Minister for Infrastructure and Transport, May 2020	1) Promote partnerships between public institutions and construction companies innovative self-driving vehicles and means of transport 2) Promote the ecosystem of the autonomous, connected, ecological vehicle and shared, the establishment of a hub for technological development and production innovative vehicles.	The protocol aims to develop and support applied research, experimentation and prototyping, production and training of new professionals in the field of innovative self-driving and connected vehicles and means of transport, as well as the interest in creating services with social impact for the country	National	Yes	Effective
5	State budget forecast for the year 2018 financial statement and multi-year budget for the three-year	National law 27 dicembre 2017, n. 205.	1) Incentives For the purposes referred to in this law, the expenditure of one million euros for each of the years 2018 and 2019	In order to support the dissemination of good practices technologies in the digital transformation process of the national road network (Smart Road) as well as purpose of promoting development, realization on the way prototyping, experimentation and validation of solutions applications	National	No	Effective

Nr	Name of Policy	Type of policy	Key terms	Main points	Governmental level	EU legal basis?	Status
	period 2018-2020.			dynamically updated to specifications functional, to evaluate and update dynamically the functional specifications for Smart Roads and to facilitate a fair possibility of access to the productive world economical to experimentation, experimentation is authorized on the road of Smart Road solutions and connected and automatic driving			
6	Department for Digital Transformation (DTD) at the Presidency of the Council of Ministers, responsible for the PNRR M1C1 – 1.4.6 ("Mobility as a Service for Italy") measure – in synergy with the Ministry of Infrastructure and Transport (MIT)	Decree no. 150/2023 – PNRR "Maas for Italy"	1) Funding of projects favouring in the cities of Milan and Turin, open and participatory testing laboratories, called Living Labs, will also be created to test innovative solutions for local transport, such as advanced driver assistance systems and autonomous and connected driving.	The MaaS for Italy project, promoted by the Ministry of Sustainable Infrastructure and Mobility (MIMS), is facilitating the testing of autonomous mobility technologies in cities such as Milan, Naples, Rome, and Turin, among others. This project promotes the integration of digital services and platforms to improve the accessibility of public transport, including autonomous vehicles, through collaboration between multiple operators	National	Yes	Closed
7	"Smart Road Analysis - Check	Guidelines	Smart Road "stamping"; self-assessment	It indicates to dealers and operators in the sector the functional and technical	Technical guidelines	Yes	Effective

Nr	Name of Policy	Type of policy	Key terms	Main points	Governmental level	EU legal basis?	Status
	list" (Technical support observatory for Smart Roads and for the connected and self-driving vehicle) 05/27/2024, as subsequently modified			characteristics for which it will be possible to proceed with the MIT Smart Road "stamping". It is a self-assessment guide to verify consistency with the specifications of the Ministerial Decree. 70 of 28 February 2018 and the related Annex A and fill any gap.			
8	Technical report template preparatory to the Smart Road sticker request, 22/10/2024 (Technical support observatory for Smart Roads and for the connected and self-driving vehicle)	Guidelines	Infrastructure and vehicle interoperability	Integration of the "Smart Road Analysis - Check list" guide. It describes in detail the digital transformation process carried out on the road infrastructure aimed at the introduction of traffic observation and monitoring platforms, data and information processing models, advanced services for infrastructure managers, public administration and users of the road to the creation of a technological ecosystem conducive to interoperability between infrastructures and new generation vehicles.	Technical guidelines	Yes	Effective
9	Public notice 18 June 2024 Prot. n. 325/2024 for	Regional (Piemonte)	MaaS4Piemonte	Identification of MAAS Operators within the "MaaS4Piemonte" project	Regional	No	Effective

Nr	Name of Policy	Type of policy	Key terms	Main points	Governmental level	EU legal basis?	Status
	expression of interest aimed at identifying MAAS operators within the “MaaS4Piemonte” project						
10	Autonomous driving: the Piedmont Region at the forefront of innovation and safety	Regional (Piemonte) policy endorsement	Policy support and endorsement of projects on CCAM funded by EU and Ministry of Transport and Infrastructure	The Italian Highway Code does not yet allow the full use of this technology. The Piedmont Region is calling for adequate regulatory intervention to allow a gradual introduction of autonomous driving experimentation	Regional	Yes	Effective

#### Links

1. <https://www.gazzettaufficiale.it/eli/id/2018/04/18/18A02619/sg>
2. <https://mit.gov.it/documentazione/smart-road-osservatorio-tecnico-di-supporto>
3. <https://www.normattiva.it/uri-res/N2Ls?urn:nir:stato:decreto.legge:2020;76>
4. [https://www.mit.gov.it/sites/default/files/media/notizia/2020-05/Guida\\_Autonomia\\_MID\\_MIT\\_.pdf](https://www.mit.gov.it/sites/default/files/media/notizia/2020-05/Guida_Autonomia_MID_MIT_.pdf)
5. <https://www.gazzettaufficiale.it/eli/id/2017/12/29/17G00222/s>
6. <https://www.mit.gov.it/comunicazione/news/pnrr-mobility-service-presto-la-sperimentazione-sette-nuovi-territori>
7. <https://www.mit.gov.it/nfsmitgov/files/media/documentazione/2024-05/Analisi%20Smart%20Road%20-%20CHECK%20LIST.docx>
8. <https://www.mit.gov.it/nfsmitgov/files/media/documentazione/2024-11/MODELLO%20RELAZIONE%20Smart%20Road.pdf>
9. [https://www.5t.torino.it/wp-content/uploads/2024/06/Manifestazione-interesse-MaaS-Operator\\_MaaS4Piemonte.pdf](https://www.5t.torino.it/wp-content/uploads/2024/06/Manifestazione-interesse-MaaS-Operator_MaaS4Piemonte.pdf)
10. <https://www.regione.piemonte.it/web/pinforma/notizie/guida-autonoma-regione-prima-linea-per-innovazione-sicurezza>

Nr	Name of Policy	Type of policy	Key terms	Main points	Governmental level	EU legal basis?	Status
1	Code of Practice: Automated Vehicles Testing	National standard	Aims to encourage flexibility in innovation Requires safety driver or operator Vehicle is roadworthy Insurance in place Needs safety case Testing of passenger or freight services must comply with the current regulatory regimes.	Safe trialling and use of automated vehicle technologies and services on public roads. Support cooperation between trialling organisations and those responsible for traffic management infrastructure, law enforcement, increasing sharing of information.	National	N/A	Effective
2	Automated Vehicles Act (2024)	National regulation	Provides framework for testing of Automated vehicles without safety driver or Officer. Creates permitting regime Ability to restrict advertising.	Ability to create requirements for testing with no user in charge Ability to mandate data collection and safety reporting. Criminal liability. Allows potential for bus like and taxi like services to not be subject to the relevant legislation, subject to consultation with local traffic commissioner / authorities	National	N/A	Mostly effective - but certain powers are only enabled by further regulation - which is in development
3	Local Traffic Management Act (2008)	National regulation	Update of previous legislation around the provision and regulation of road transport services and the subsidising of passenger transport services by local authorities.	Defines requirements for local traffic commissioners who approve transport services. Requirements for bus services, taxis and transport policy.	National	N/A	Effective

Nr	Name of Policy	Type of policy	Key terms	Main points	Governmental level	EU legal basis?	Status
4	Bus Services Act (2017)	National regulation	Set out new requirements for bus services around franchising, bus partnerships and ticketing, supplements Local Traffic Management Act (2008)	Includes ability for local authorities to mandate standards for local buses. Requirements for in-vehicle information (visual and audio).	National	N/A	Effective
5	Equality Act (2010)	National regulation	Protects people from discrimination in the workplace and in wider society.	Defines protected characteristics which should be subject to non-discrimination: Age, Sex, Disability, Race, Religion / Belief, Marriage Status, Gender reassignment, Sexual Orientation) Public Sector Duty requires public sector bodies to aim to reduce discrimination	National	N/A	Effective
6	BSI Flex 1890 - Connected and Automated Mobility Vocabulary	Code of practice	Definitions for automated vehicles and associated services	Defines terminology linked to different levels of automated services, whether there is an operator on board. Terminology used in Automated Vehicles Act	National	N/A	Effective
7	BSI Flex 1886 v2.0 System aspects for remote operation of vehicles – Guide and BSI Flex 1887 - Human Factors for	Code of practice (paid for, so only viewed summary)	Guidance on remote operation of automated vehicles - split into volumes on road.	Some relevance to automated bus services - particularly around communication and interfaces on vehicles, although this is not a focus.	National	N/A	Effective

Nr	Name of Policy	Type of policy	Key terms	Main points	Governmental level	EU legal basis?	Status
	Remote Operation of Vehicles – Guide v1.0						
8	PAS 1884 - Safety Operators in Automated Vehicle Testing and Trialling	Code of practice (only viewed summary)	Provides guidance for selection, training and performance of safety operators for automated vehicle trialling and testing.	May have some relevance for how safety operators interact with passengers.	National	N/A	Effective
9	National Rail Conditions of Travel	Industry de-facto standard	Sets out rights as a passenger on rail services	Covers booking journey, ticketing, journey details, accessibility, luggage and compensation in event of delay / cancellation	National	N/A	Effective

#### Links

1. <https://www.gov.uk/government/publications/trialling-automated-vehicle-technologies-in-public/code-of-practice-automated-vehicle-trialling>
2. <https://www.legislation.gov.uk/ukpga/2024/10/section/3>
3. <https://www.legislation.gov.uk/ukpga/2008/26/contents/made>
4. <https://www.gov.uk/government/collections/bus-services-bill-overview>
5. <https://www.legislation.gov.uk/ukpga/2010/15/contents>
6. <https://www.bsigroup.com/en-GB/insights-and-media/insights/brochures/bsi-flex-1890-connected-and-automated-mobility-vocabulary/>
7. <https://www.bsigroup.com/en-GB/products-and-services/standards-services/connected-and-automated-mobility-cam-standards-programme/>
8. <https://www.bsigroup.com/en-GB/insights-and-media/insights/brochures/pas-1884-safety-operators-in-automated-vehicle-testing-and-trialling/>
9. <https://www.nationalrail.co.uk/travel-information/your-rights-and-obligations-as-a-passenger/>



## 9. Appendix B: Agenda of the SINFONICA Workshops

The Agenda of the SINFONICA Workshop in Birmingham on September 9th 2024

	Topic
14:00 – 14:15	Who: <b>Giulia (ICOOR)</b> Welcome, introduction of SINFONICA and objectives of the Workshop:
14:15-14.30	Introduction from participants
14:30- 15:00	Who: <b>Representative from GoI</b>  Lessons learnt from the SINFONICA consultation activity and insights for policy recommendations – intro + 5 minutes each GoI.:  Trikala Hamburg West Midland Nord Brabant
15:00: – 15:15	Coffee break
15:15– 16:00	Who: <b>Riccardo Enei or Andrew Winder:</b>  Summary of the SINFONICA policy recommendations, including D5.2  Feedback of the stakeholders: topics <ol style="list-style-type: none"> <li>1. anything missing in terms of policy recommendations?</li> <li>2. Are there limitations arising from the SINFONICA GoI local situations ?</li> <li>3. Further considerations from the SINFONICA GoI</li> </ol>
16:00- 16:45	Who: <b>All</b> Open discussion to agree on a common vision.
16:45 – 17:00	Who: <b>All</b> Closing remarks and next steps

The Agenda of the SINFONICA Workshop in Den Bosh (Noord Brabant, The Netherlands) on 28<sup>th</sup> January 2025

Topics
Welcome (10 mins – host + tour de table)
Introduction from participants
Overview of SINFONICA and introduction to the workshop (10 mins)
Coffee break
<p>Roundtable sessions (each participant will join 2 tables (so we do 2 rounds):</p> <ul style="list-style-type: none"> <li>• <b>Draft recommendations on service planning</b> – Why this service/route? Why CCAM? (10 mins presentation + 10 mins discussion = 20mins)</li> <li>• <b>Draft recommendations on vehicle specification</b>, staffing and operations (10 mins presentation + 10 mins discussion = 20mins)</li> <li>• <b>Draft recommendations on passenger information and communication</b> with users and the general public (10 mins presentation + 20 mins discussion = 10mins)</li> <li>• <b>Draft recommendations on data collection and evaluation</b> (10 mins presentation + 10 mins discussion = 20mins)</li> </ul>
Coffee break
<ul style="list-style-type: none"> <li>• Overview of the Knowledge Map Explorer and feedback (presentation + discussion = 30 mins)</li> <li>• Wrap-up and next steps (10 mins)</li> <li>• Close (Presentation Move2CCAM + short discussion about topic related to their project)</li> </ul>

The Agenda of the SINFONICA Workshop held at ERTICO premises on 14th February 2025

	Topic
09:30 – 09:50	Welcome and introduction to the workshop
	<b>Part 1: Towards policy and project recommendations user-friendly and inclusive transport by CCAM</b>
09:50 – 11:00	Roundtable session 1 on recommendations (in 2 groups) Group A: Draft recommendations on service planning, vehicles and operations Group B: Draft recommendations on passenger service (including staffing), information and communication with users and the general public
11:00 – 11:15	Coffee break
11:15 – 12:00	Roundtable session 2 on recommendations (in 2 groups, reversing the above topics)
12:00 – 12:15	Wrap-up and next steps for recommendations.
	<b>Part 2: SINFONICA Knowledge Map Explorer</b>
12:25 – 13:40	Time to use the Knowledge Map Explorer individually and completing some assigned tasks
13:00 – 14:00	Close and light lunch



## For more information

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