



## **Deliverable 5.4**

Guidance and recommendations for  
demonstrating and implementing user-centric  
CCAM



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## Executive Summary

This deliverable presents the guidance and recommendations for user-centric CCAM, meaning it takes into greater consideration the interaction between users and CCAM. It focuses on CCAM for public and shared transport services and their acceptance and use by all segments of the population, but in particular users with specific needs, such as (potentially) vulnerable users and other people with mobility challenges (PMC).

It is the final deliverable of Work Package 5 (WP5) of the SINFONICA project, “Strategies, methodologies and recommendations for an inclusive equitable and accessible future CCAM” tasks: T5.4: Guidance on implementation and communication and T5.5: Recommendations for large-scale demonstration projects.

This work has capture outcomes from:

- Interviews, focus groups and workshops in the four Groups of Interest (GoI) cities and regions in the SINFONICA project: Hamburg (DE), West Midlands (UK), Noord Brabant (NL) and Trikala (GR).
- Previous tasks in WP5, including project workshops.
- Other relevant related projects and publications identified during the SINFONICA project.

Guidance and recommendations are focused on:

- CCAM Implementation
- CCAM Demonstration
- Communications (to the users, public and policy makers)

A summary of our recommendations follows:

Guidance for CCAM implementation	
<b>Public transport integration</b>	<ul style="list-style-type: none"> <li>• Same “look and feel” as the rest of the public transport system.</li> <li>• Clear advance information on vehicle type (if staffed or not, etc.)</li> <li>• Frequency, speed and service amplitude (first and last services, days of the week operated) should be as for a “normal” service, to attracting different kinds of users and fulfil a variety of needs.</li> <li>• Connections with other modes/services.</li> </ul>
<b>Ticketing and fares</b>	<ul style="list-style-type: none"> <li>• Different payment options.</li> <li>• No requirement for online account or smartcard.</li> <li>• Validation of passes and season tickets.</li> <li>• Fare structure the same as for other local public transport services (flat fare, distance-based or zonal), with no premium.</li> <li>• A free fare might be appropriate for very short-distance shuttles, otherwise usage might be low. But depends on funding, operator and business case.</li> </ul>
<b>Booking</b>	<ul style="list-style-type: none"> <li>• Different options to book in case of DRT (not only online).</li> <li>• Acceptance of last-minute bookings and changes.</li> </ul>

	<ul style="list-style-type: none"> <li>• May require the availability of more vehicles (perhaps not all CCAM-enabled) in order to satisfy peak demand or conflicting bookings.</li> <li>• Reliability is important for the passenger: if a booking cannot be honoured, or if a later alternative is offered, it might cause them to miss an appointment or long-distance transport connection.</li> </ul>
<b>Vehicle type and configuration</b>	<ul style="list-style-type: none"> <li>• Consider peak travel periods if proposing small vehicles. As an alternative to procuring full-size CCAM vehicles, traditionally driven full-size buses could be used at peak times / on trunk routes, supplemented by automated minibuses at off-peak times or on peripheral routes.</li> <li>• Depending on the speed of the vehicle (especially if outside urban areas), seated passengers only (possibly with seatbelt requirements) may be appropriate.</li> </ul>
<b>Staffing</b>	<ul style="list-style-type: none"> <li>• CCAM should not be a reason to remove staff, but to redeploy staff in different roles (more customer-facing).</li> <li>• Staff are essential in larger vehicles and at higher speeds, mainly for passenger security and peace of mind (consider that not all passengers might respect the rules; these people cannot be allowed to stop and disrupt the journey for other passengers).</li> </ul>
<b>Funding</b>	<ul style="list-style-type: none"> <li>• Develop multi-stakeholder collaborative funding models for initial vehicle, infrastructure and data platform costs</li> <li>• Need to consider costs related to iterative development and testing (including lab and closed track testing)</li> <li>• Automated vehicles need funding for specialist operations and maintenance</li> </ul>
<b>Guidance for CCAM Demonstration</b>	
<b>Route/site selection</b>	<ul style="list-style-type: none"> <li>• Provide a service that is close as possible or exceeds existing public transport service</li> <li>• Allows mixture of automated and manually driven vehicles (which allows a service to be maintained even if the automation demonstration is temporary)</li> <li>• Consider different kinds of CCAM services including higher traffic speeds and busy areas</li> </ul>
<b>Ticketing and payment</b>	<ul style="list-style-type: none"> <li>• Ticketing and payment services should be identical to that of the rest of the public transport network</li> <li>• A variety of payment options (online, contactless, smartcard, cash).</li> <li>• If services are free, stimulate a payment system to gauge public interactions.</li> <li>• Fares no higher or equivalent to other local public transport (or for shared taxis, equivalent fares to normal taxis)</li> </ul>
<b>Measurement and evaluation</b>	<ul style="list-style-type: none"> <li>• Goals and objectives should be developed through participatory co-creation strategies</li> <li>• Evaluation needs to be an integral part of the process and considered from the start</li> <li>• Utilise flexible evaluation tools</li> </ul>

Communications (to the users, public and policy makers)	
Assistance systems	<ul style="list-style-type: none"> <li>Physical presence of assistance systems are essential to enable to transition to automated systems.</li> <li>Hybrid approaches (mixture of technologies / staff) may be required including fallback solutions</li> </ul>
Passenger information	<ul style="list-style-type: none"> <li>Information must be clear, multi-sensory, multimodal, and context-adapted</li> <li>Avoid dense text or overly technical descriptions</li> </ul>
Personnel and staff training	<ul style="list-style-type: none"> <li>Must go beyond technical skills and include soft skills in communication and disability/vulnerability awareness</li> </ul>
Emergency communication	<ul style="list-style-type: none"> <li>Designed with universal communication in mind</li> <li>Provide clear, calm and multisensory alerts in event of incidents</li> </ul>
Passenger identification technologies	<ul style="list-style-type: none"> <li>Can be a useful tool but privacy concerns must be managed</li> <li>Care must be taken not to assume that all users of the identified group have the same</li> <li>needs</li> </ul>
Promotion and communication of benefits	<ul style="list-style-type: none"> <li>CCAM services should be branded in a visually appealing way</li> <li>Branding should be complementary to the existing public transport services but also make users aware of the automation</li> <li>Ensure the public are clear on the capabilities and functions of automated vehicles</li> </ul>

Further information on these recommendations is contained within this document, but also within the SINFONICA Knowledge Map Explorer (<https://sinfonica-kme.eu>) provides an electronic mechanism to explore these recommendations.

These findings have also been discussed in a series of webinars that took place in 2025:

- Connected and Automated public transport policy, information and awareness (15 July 2025)
- Planning for Connected and Automated public transport: How to engage with citizens (25 August 2025)
- Operation of Connected and Automated public transport: Recommendations for demonstration projects and public services (September 2025).

Recordings of these webinars are made available through the project’s communication media and will be made available through the ERTICO Academy (<https://ertico.com/discover-ertico/ertico-academy>) .

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## Abbreviations

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ACT	Automated and Connected Transport
ADAS	Advanced Driver Assistance Systems
AI	Artificial Intelligence
AVs	Automated Vehicles
CAD	Connected Automated Driving
CATS	Connected Automated Transport Systems
CAV	Connected / Automated Vehicle
CCAM	Connected, Cooperative and Automated Mobility
C-ITS	Cooperative Intelligent Transport Systems



C-V2X	Cooperative Vehicle-to-X
DRT	Demand Responsive Transport
GoI	Group(s) of Interest
HMI	Human Machine Interface
IoT	Internet-of-Things
KPIs	Key Performance Indicators
MaaS	Mobility as a Service
OEM	Original Equipment Manufacturers
PMC	People with Mobility Challenges
V2I	Vehicle to Infrastructure
V2V	Vehicle-to-vehicle
V2X	Vehicle-to-X
VRU	Vulnerable Road Users
WP	Work Package

## 1. Introduction

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### 1.1 Overview, scope and intended audience

This deliverable presents the guidance and recommendations for user-centric CCAM, meaning it takes into greater consideration the interaction between users and CCAM. It focuses on CCAM for public and shared transport services and their acceptance and use by all segments of the population, but in particular users with specific needs, such as (potentially) vulnerable users and other people with mobility challenges (PMC).

It represents the final deliverable of Work Package 5 (WP5) of the SINFONICA project, “Strategies, methodologies and recommendations for an inclusive equitable and accessible future CCAM”. It brings together the results of two tasks:

- **T5.4: Guidance on implementation and communication** – to produce strategies aimed at different audiences involved in developing, testing, deploying, operating, and evaluating CCAM.
- **T5.5: Recommendations for large-scale demonstration projects** – to adapt the guidance in T5.4 above and further build on it to provide specific recommendations and guidance for large-scale demonstration projects.

The output of these tasks is also summarised in the SINFONICA Knowledge Map Explorer (<https://sinfonica-kme.eu>).

This deliverable is aimed at public authorities and agencies (at the implementation level), researchers, industry and solution developers, and transport and mobility operators/service providers. Chapter 4 in particular is aimed at ongoing or proposals for CCAM demonstration projects.

### 1.2 Structure of the document

After this introduction, Chapter 2 summarises the approach to the work.

Following this, Chapter 3 provides recommendations and guidance on CCAM implementation, including planning, operations and funding. Chapter 4 considers additional guidance for CCAM demonstration projects. Chapter 5 provides recommendations and guidance on communications with citizens in general and users of public and shared transport services by CCAM in particular. Conclusions are provided in Chapter 6.

### 1.3 Links with other SINFONICA outputs

This deliverable forms the final part of WP5, following and building upon the previous WP5 deliverables as follows:

- D5.1 Equity practices and social indicators.
- D5.2 CCAM solutions and vulnerable users: Opportunities and constraints
- D5.3: Vision and policy recommendations for user-centric CCAM.



It also draws upon outputs of the following WP3 (Understanding expectations, concerns and desires towards CCAM) deliverable:

- D3.1: Report for activities in the Groups of Interest.

Summary recommendations are also integrated into to the SINFONICA Knowledge Map Explorer (<https://sinfonica-kme.eu>), an online resource developed in WP4 of the project. These fall under the categories:

- Policy recommendations (from D5.3)
- Guidelines on CCAM-based public transport operations (from this deliverable)
- Guidelines on communications regarding CCAM-based public transport (from this deliverable)
- Guidelines for CCAM demonstration projects (from this deliverable).

Finally, recommendations also feature in a series of three webinars under the dissemination work package of the project (WP6), as follows:

- Connected and Automated public transport policy, information and awareness (15 July 2025)
- Planning for Connected and Automated public transport: How to engage with citizens (25 August 2025)
- Operation of Connected and Automated public transport: Recommendations for demonstration projects and public services (September 2025).

Recordings of these webinars are made available through the project's communication media and will be made available through the ERTICO Academy (<https://ertico.com/discover-ertico/ertico-academy>).

## 2. Approach

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The development of guidelines and recommendations took place by means of:

- Outcomes of the interviews, focus groups and workshops in the four Groups of Interest (GoI) cities and regions in the project: Hamburg (DE), West Midlands (UK), Noord Brabant (NL) and Trikala (GR).
- Previous tasks in WP5, including project workshops.
- Outcomes from other related projects and publications.

### 2.1 Outcomes from the four Groups of Interest

Outputs from the participatory approach undertaken in the four GoI areas in the project are presented in D3.1: Report for activities in the Groups of Interest. The following are the key conclusions of this work that contribute to recommendations:

- Local context matters: Each GoI site offered unique insights shaped by cultural, geographical, and institutional factors. Tailored strategies were essential to reach diverse groups and ensure inclusivity. Even for similar types of service, a single strategy will not be appropriate everywhere.
- Inclusivity is a process, not an outcome: Engaging vulnerable groups required intentional design, flexible tools, and trust-building mechanisms. Successful outreach often depended on working through trusted community organisations and meeting people in familiar settings. Citizen engagement from an early stage is essential.
- Trust and understanding drive acceptance: Concerns around safety, data privacy, and accessibility were prominent across all sites. Transparent communication and opportunities for experiential learning (e.g. through pilot demonstrations) were critical enablers of trust.
- Stakeholder networks were strengthened: The co-creation process activated and reinforced local networks of mobility stakeholders, which are expected to continue beyond the project lifetime and support future CCAM-related initiatives.
- Participatory engagement can lead to actionable change: In several cases, the insights generated have already been integrated into ongoing policy revisions, pilot planning and stakeholder initiatives.

### 2.2 Previous tasks in WP5

The task on Equity practices and social indicators (reported in D5.1) reviewed indicators and practices used in recent EU and some national projects relating to CCAM, with 45 projects covered in total. Indicators focused on social equity in transportation reflect the four As: Accessibility, Affordability, Availability and Acceptability. This task looked at the aspects of social equity most frequently addressed as well as the most commonly addressed CCAM user groups. Acceptability and accessibility were widely addressed in CCAM projects, but affordability was not. Nevertheless, work in the subsequent task, in which 43 CCAM public or shared transport services or project demonstrations were reviewed, found that almost all of these demonstrations were free to the user, hence affordability was not considered. This task, reported in D5.2, looked at the scope and features

of CCAM for public and collective/shared transport, including vehicle type, size and configuration, staffing levels, service type, fares/payment (where existing) and types of roads used.

SINFONICA D5.2 also defined four CCAM public/collective transport scenarios (combination of features such as type of service and vehicle, staffing, etc.), based on actual deployments and most likely future deployments (looking also at new and upcoming large-scale demonstration projects). For each scenario, a flow diagram of journey steps was created, with alternative steps in case of variations / incidents.

The policy recommendations task, reported in D5.3, developed a taxonomy of policy domains covering rules and regulations, market-based instruments, infrastructure development, and information and awareness. It looked at a sample of six European countries in terms of policies regarding CCAM as well as inclusivity, equity and accessibility of public transport in general. Policy outcomes from a sample of EU projects were also included.

A series of workshops contributed to building and defining guidance and recommendations. These were:

- Internal workshop in Birmingham (UK), September 2024
- Stakeholder workshop aimed at regional and national partners in the Netherlands, in Den Bosch (NL), January 2025
- Stakeholder workshop aimed at those working at a European level (e.g. research projects) in Brussels (BE), February 2025
- Stakeholder workshop of CCAM researchers held as a side-event to the EUCAD Conference in Ispra (IT), May 2025.

### 2.3 Outcomes from other related projects and publications

In addition to demonstration projects reported in D5.2, the project participated in liaison activities with several other CCAM projects, resulting in experience sharing. These include [Cultural Road](#), [Diversify-CCAM](#), [FAME](#), [In2CCAM](#), [MOVE2CCAM](#) and [PAVE Europe](#).

External references, listed in Chapter 7 at the end of this deliverable, were also used to contribute to recommendations.

### 3. CCAM Implementation

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This section focuses on the implementation of public and shared passenger transport using CCAM. It provides advice and guidance in three areas:

- Planning,
- Operation and
- Funding.

This includes implementation as part of project demonstrations / pilots and trials, although specific additional points for demonstration projects are given in Chapter 4.

As a general point, existing guidance on inclusion and accessibility for public transport services should be applied to CCAM services, although there will be some specific considerations related to the automation.

Further commentary is included on cross-border and international considerations.

#### 3.1 Planning

CCAM service planning should be integrated into other transport services as much as possible, rather than organised as a stand-alone service.

##### **Ticketing and integration with other public transport services**

While most CCAM demonstration projects to date have offered free services to users for a limited demonstration period, it is envisaged that as CCAM is rolled out, it will become a part of the normal public transport system, which in most cases is subject to fare payment. Ticketing and payment services should be identical to that of the rest of the public transport network, with:

- A variety of payment options (online, contactless, smartcard, cash).
- Fares no higher or equivalent to other local public transport (or for shared taxis, equivalent fares to normal taxis), so that no two-tier system is created and to enable CCAM to be accessible to all. Further research is recommended on this topic: there is a lack of literature on users' willingness to pay for CCAM services. Although issues of levels of subsidy and fairness need to be considered if CCAM services cost more to operate than conventional services with a driver (which is possible in the short term). Where there is a zonal fare structure, distance cost, or a flat fare per journey, the pricing should be within that structure.
- Information (maps, timetables, online material, apps, staffed kiosks, telephone) should be integrated with the rest of the network (see also Chapter 5 on communications).
- Where the service exists as a feeder or last-mile service, for example linking a railway station or a regular bus, coach, tram or metro line, timetables should be coordinated, with flexibility to maintain connections in case of late running services, such as meeting the last train of the evening.

## Booking

The possibility of using CCAM for Demand-Responsive Transport (DRT) in low-density – especially rural – areas, as well as in peri-urban areas at low demand times such as at night, is widely seen as a valuable use case, but one which has rarely been successfully demonstrated. DRT can have mixed results. In places where no service, or a poor service, previously existed, it provides additional accessibility and connectivity to citizens. But in some cases where it has replaced a regular bus route, ridership has fallen because of the requirement to book, putting off potential impromptu passengers making a last-minute decision to travel. Booking can also dissuade people interested in using public transport for non-essential purposes (e.g. leisure), even if the service is open for all journey purposes, as there is sometimes a perception that such services are for essential users only – perhaps for seniors, disabled people or other PMC. The booking process can also dissuade passengers both in terms of the booking method, the flexibility to change or cancel bookings without penalty, the reliability or priority in the event of several people booking different trips for the same time slot, and the booking notice required.

Methods to pre-book demand-responsive travel should not rely solely on apps and online media, which are not accessible to certain user groups. A telephone alternative should be provided, but also booking can be made possible via agents, such as pay points in local shops, libraries, municipal buildings, staffed public transport stations, etc.

For the time being at least, it is expected that DRT using CCAM vehicles would require on-board staff (assistant or steward, if not a safety driver), due to the flexible nature of the service, often unclear or unmarked pick-up or drop-off points, the potential for conflicting journey requirements of different passengers, and the possibility of passengers changing their minds on their destination during the trip itself. These staff should therefore also be able to handle bookings for future trips.

If staff are required, then the service should not be operated if they are unavailable or there needs to be a robust mechanism to provide alternative arrangements for those with accessibility needs.

## Vehicle configurations

The type of vehicle used would depend on:

- Expected maximum speed of the service
- The types of roads on which they will operate
- The provision of stops and supporting infrastructure (particularly if they allow level boarding)
- Whether or not standing passengers are allowed
- Ridership levels and service frequency.

To date, CCAM has mostly focused on small shuttle-like vehicles, running at very low speeds. These are appropriate for some specific use cases, such as on a limited site (business park, leisure attraction, hospital, airport, etc.) where the trip distance is short. They can therefore run in many cases in fully autonomous mode without staff on board, perhaps with a virtual operator or possibly with staff at each end in case of a simple service with two stops.

For busier and longer distance services, larger vehicles and higher speeds are needed. In these cases:

- A safety driver would be needed in the medium term, especially in complex mixed-traffic situations. This is less for safety than for a) reassurance and personal security to passengers, and b) in order that the driver can override the system if more “assertive” driving behaviour is needed, for example exiting from a priority junction or roundabout where the automated driving technology would be so cautious to the extent that the vehicle would be waiting a very long time in case of heavy traffic.
- For higher speed services, e.g. over 50 km/h, passengers would need to be seated, and possibly also be required to wear seatbelts as automated driving can lead to sudden stops. A staff member would therefore be required in order to enforce this. Unlike robotaxis (where the vehicle would not move until the passenger complies with the rules) enforcement by video or sensors is not sufficient in a general public transport vehicle (bus or minibus). A single passenger not complying with the rules cannot cause the vehicle to stop for long periods, disrupting the travel of all other passengers (and possibly also blocking the roadway).

Use of small shuttle vehicles in many cases is not suitable for a regular public transport service, unless there are a large number of them creating a very frequent service. Otherwise, in case of a small vehicle reaching its capacity (8 to 12 passengers on average), further passengers (including potentially PMC) would be left behind at stops, thus rendering the service unreliable for users who need and expect to be at their destination at a certain time.

Passengers should be aware in advance what kind of vehicle is operated on which service and whether there is a staff member on board.

## 3.2 Operations

### Staffing

A scheduled public transport service could potentially include a mixture of manually driven and automated vehicles, with real-time information to ensure users know what to expect at which time. If this information is provided, it needs to be accurate, and processes put in place.

Someone who needs a staffed vehicle could then wait for the next one (provided that the frequency is high, to avoid long waiting times). In this way, AVs could enhance the frequency of an existing service and provide additional capacity, while retaining the current level of staffed vehicles.

Monitoring for passenger safety and security is a must, including an operator alert system. For passengers, personal security is at least as much a concern as road safety. Many will not feel comfortable or even fully refuse to share a small vehicle with strangers. For a larger vehicle with a staff member on board, the concern is much less. There may need to be a need for training or reskilling of staff if they are less focused on the driving task. There also needs to be consideration on how to ensure the safety of staff in the event of a confrontation with a passenger.

## **Fare payment and control**

Fare payment, checking (validation, where needed) and enforcement should take place in the same way as the rest of the system. While ticket barriers are not generally practical for road-based transport, roaming physical ticket inspection staff can be deployed, or where an on-board assistant or steward is present in the vehicle, they can also have ticket selling and checking duties.

### **3.3 Funding**

Funding opportunities are critical to the successful setup and deployment of CCAM trials. Indeed, these trials often involve complex infrastructure, advanced technologies, multi-stakeholder collaboration, and extensive testing over time and geographies.

The key domains interested by funding are the following:

#### **1. High Upfront Costs**

Upfront costs are often a major barrier to entry for public agencies, SMEs, and even larger mobility operators or OEMs. Funding might directly support these early-stage investments, helping the implementation of CCAM demonstrations and trials.

The following activities are relevant in the context of upfront costs, each one can be mitigated by funding from EU, national or local funding bodies. Indeed, these activities can cost millions of euros per pilot corridor, and public funding helps reduce the burden on core city budgets.

Infrastructure investment: some CCAM services will need infrastructure investment such as Smart traffic lights, roadside units (RSUs), precision location systems, 5G/V2X networks and edge/cloud computing. What is needed will depend on the capabilities of vehicles, operating approach and need to make services more reliable / robust.

Vehicle instrumentation: Equipping vehicles with sensors, connectivity (e.g. C-V2X, DSRC), automation components. Outfitting even a small fleet may be prohibitively expensive for startups or municipalities. Grants or R&D funding absorb this cost, especially in early testing phases.

Data platforms: Building the data infrastructure for real-time communication, storage, and analytics. This may include upgrades to existing ticketing, scheduling and information systems to accommodate CCAM services. This should also include physical and cybersecurity considerations.

#### **2. Iterative Development and Testing**

Besides, CCAM trials may require multiple phases (lab testing, closed-track trials, real-world pilots), each demanding dedicated resource. Repeated simulation, validation, and refinement cycles can be expensive and time-consuming without stable funding. These require upfront capital (construction, software, staffing) and in such a context, public-private co-investment can enable access to shared facilities.

#### **3. Multi-Stakeholder Collaboration**

Funding ensures alignment and commitment across public authorities, private companies, OEMs, research institutes, insurance companies and telecom providers.

Funding can mitigate risks for industry partners and encourages innovation by reducing financial exposure. However, issues of insurance coverage and risk need to be discussed and agreed, particularly regarding responsibilities in event of accident or injury.

#### **4. Operational Considerations**

CCAM Services will require different operating models compared to conventional vehicles with drivers. Considerations include maintenance of vehicles and associated technologies such as sensors. This will either need reskilling of maintenance staff or specialist contracts. There is also likely to be reporting and data collection requirements to comply with national legislation.

### **3.4 Cross-border and scalability challenges**

CCAM trials and demonstrations often aim to be cross-border or inter-regional, especially in the EU, requiring harmonization of standards and technical requirements.

Funding may support the overall coordination across regions, diminishing the negative impacts of language/legal barriers, and supporting infrastructure compatibility. Public funding or EU cascade funds can help cities and regions de-risk legal uncertainties and draft operational frameworks.

SINFONICA Deliverable 5.3 on Vision policy recommendations for user-centric CCAM provides an extensive review of policies undertaken and embedded in legislation on CCAM from a sample of European countries: France, Germany, Greece, Italy, the Netherlands and the UK, according to a common template.

The review allows, on the one hand, to sketch an overview on funding practices in a sample of EU countries, and, on the other, to stress current limitations, providing the basis for drawing conclusions in terms of recommendations.

In **Italy**, the national law of December 27, 2017, no. 205 (state budget forecast for the year 2018 and multi-year budget for the three-year period 2018-2020) provided for an expenditure of one million euros for each of the years 2018 and 2019 to support the dissemination of good technological practices in the process of digital transformation of the national road network (Smart Road) and to promote the development, on-road realization of prototypes, experimentation, and validation of connected and automated driving solutions and applications.

Other funding activities were planned under the National Recovery Plan PNRR: Decree no. 150/2023 – PNRR "MaaS for Italy" (Mobility as a Service for Italy), providing for the financing of projects aimed at promoting the development of innovative transport solutions. This project is facilitating the experimentation of autonomous mobility technologies in various Italian cities such as Milan, Naples, Rome, and Turin, and includes the creation of "Living Labs" (experimental laboratories) in Milan and Turin to test innovative solutions for local transport, including advanced driver assistance systems and connected autonomous driving.

Other decrees (the Law Decree of July 16, 2020, No. 76, on urgent measures for simplification and digital innovation), introduced measures, projects, and incentives to accelerate the transition towards sustainable and intelligent mobility. This decree allowed for further regulatory simplifications to encourage the experimentation of innovative technologies, including autonomous

driving vehicles. An example of a project that benefited from this regulatory framework was the testing of autonomous shuttles in Turin (SHOW project).

Political support, funding and endorsement of CCAM trials have also been planned at local level (regional). The Piedmont Region has expressed political support and endorsement for projects on cooperative, connected, and automated mobility (CCAM).

In **United Kingdom**, the Automated and Electric Vehicle Act 2018 has been reinforced by comprehensive reforms recommended by the Law Commissions. A new Transport (Future of Transport) Bill is expected to establish safety, liability, cybersecurity, and data frameworks for AVs by 2025. The UK government has set an ambitious vision to keep the UK at the forefront of development through funding, legislation and testing to enable the sector to thrive and deliver the associated economic and societal benefits<sup>1</sup>.

Funding packages include £150 M (to 2030) via the Advanced Manufacturing Plan supports CCAV efforts. An additional £100 M (with £66 M BEIS and £34 M DfT) targets commercial deployment and safety assurance systems.

Smaller competitions include: £18.5 M supply chain grants (Sept 2023), £40 M for deployment pilots starting 2025, £16 M for supply chain SME support, and ~£2 M for feasibility studies.

In **France** the Mobility Orientation Law (2019), the first legal step enabling 2015 road testing and defining CCAM strategy, is updated through 2020 €200 M CCAM Fund (2021–2023), Supporting automated, low-carbon road projects—targeting digitization and decarbonization.

French legislation also allows for EV Subsidy Adjustments. In 2025, draft budget reduces the total ‘bonus écologique’ from €1.5 B to €1.0 B. Subsidy cuts vary across income brackets and vehicle types. Policies may exclude high-emission EVs (including some imports) while prioritizing low-income buyers, up to €7,000

In **Germany**, the Federal Act on Autonomous Driving (Sept 2021) has introduced Level 4 operation in specific zones. Incorporating technical, liability, and ethics guidelines, and mandates safety systems, the German Federal Transport Authority (KBA) now allows Level 4 public road testing nationwide.

Funding for electric commercial vehicles and bus incentives was paused in early 2024 to consolidate budgets—though existing projects will proceed. Instead, Germany redirected €1.8 billion into charging infrastructure via the Climate and Transformation Fund.

Like other EU Member States, the **Netherlands** enforces General Safety Regulation (EU 2019/2144) standards, including those enabling CCAM. Netherlands participates in cross-border CCAM projects under Horizon Europe and CINEA programmes (e.g., deployment demos, safety validation), drawing from national transport strategies and infrastructure modernisation.

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<sup>1</sup> <https://www.gov.uk/government/publications/finding-the-way-forward-location-data-to-enable-connected-and-automated-mobility/finding-the-way-forward-location-data-to-enable-connected-and-automated-mobility?>

While no national CCAM-specific law has been passed, ongoing efforts focus on MaaS integration and smart infrastructure compatible with automated vehicle trials.

**Greece** aligns with EU safety/driver assistance regulations (e.g., 2019/2144), but it hasn't enacted its own CCAM legislation yet. Greece is exploring Mobility-as-a-Service (MaaS) pilots and planning infrastructure upgrades to support future AV trials. These are largely funded via EU Cohesion Policy and NextGenerationEU recovery funds.

### **Conclusions on funding for trials and demonstrations.**

Despite direct budget allocations for incentives and experimentation are under way in the sample of EU countries, there are still limitations that prevent the support to wide scale demonstrations.

- In Italy, despite direct budget allocations for incentives and experimentations within the PNRR for autonomous mobility, the Italian Highway Code does not yet allow the full use of autonomous driving technology. The Piedmont Region, for example, while politically supporting projects funded by the EU and the Ministry of Infrastructure and Transport, is calling for adequate regulatory intervention to allow a gradual introduction of autonomous driving experimentation. This means that, although there are funds and measures for innovation and simplification of experimentation (such as Decree-Law 16 July 2020, n. 76), the basic legislation of the Highway Code still represents a significant limit for the transition from the experimentation phase to the widespread and complete use of autonomous vehicles.
- In the United Kingdom, the Automated Vehicles Act (2024), which provides a framework for the testing of automated vehicles without a safety driver and creates a permitting regime and liability framework, is indicated as "Mostly effective - but certain powers are only enabled by further regulation - which is in development". This implies that the full effectiveness of the legislation is still limited by the need to develop further implementing regulations, which can slow down the full implementation and adoption of autonomous driving technologies, despite the basic legislative framework already being in place.
- In France and Germany, national regulations on CCAM should be accompanied by substantial funding, while in Greece and The Netherland, the lack of EU-aligned but no CCAM-specific law may hamper funding activities at national level.

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 integration of CCAM operations in national legislations on safety and technical standards and in the allocation of substantial funding at national/local level, other those funding delivered at EU level (e.g. Horizon Europe call, CCAM Platform, etc).

## 4. CCAM Demonstration projects

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In addition to the planning and operational guidelines in Chapter 3 above, which are also applicable to demonstration projects, this chapter looks at specific additional recommendations to such projects.

### 4.1 Project demonstration planning and objectives

The **selection of a site** and **type of service** for a demonstration project should reflect not only the technical needs of the trials but also enable the provision of a service that is as close as possible or exceeds the level of service provided by a standard public or shared transport service. Indeed, a CCAM demonstration could even share the same route as manually driven public transport, with interspersal of vehicles, to test how they work in regular service as well as user reactions, allowing comparison between human-driven buses. This means that, even if the demonstration is temporary, the service would continue to run with standard buses afterwards.

Demonstrations should consider different kinds of CCAM services at more usual traffic speeds (including on interurban and rural routes), as well as in busy areas where an automated system might be too prudent /not assertive enough in case of being blocked by other traffic.

Demonstrations should consider **ticketing, fare payment and control**. Even in the event of a short-term free-to-use demonstration, consider how it might work for a permanent paid-for service. For example, a service could require a ticket, even if it is free. This is because sometimes a ticket or travel pass is a guarantee of insurance, that the operator is liable for the safety and well-being of the passengers.

Demonstrations should have a particular focus on how to cater for accessibility needs (including a range of different target groups) to understand how the needs of these groups can be met and the most appropriate use of technology / communications methods.

Demonstrations should consider methods to **pre-book DRT** without needing an app or smartphone. Different booking options should be provided and feedback collected on the usage levels and passenger satisfaction (and comments) on each one.

Where demonstrations use mini-shuttles (the majority to date), consider the implications of full vehicles and leaving passengers behind. One solution that could be considered and demonstrated is the platooning of small CCAM vehicles. This would provide extra capacity, but there are also implications to assess regarding mixing with other traffic.

### 4.2 Recommendations on participatory approach and its evaluation for large-scale demonstrations

In the context of large-scale CCAM demonstrations, ensuring societal acceptance and usability across all user groups is crucial. The SINFONICA project has demonstrated that participatory approaches—when systematically implemented and evaluated—can play a pivotal role in shaping inclusive, trusted, and effective mobility systems. This section presents key recommendations derived from SINFONICA’s participatory strategy and its evaluation, with a view to supporting future CCAM large-scale demonstrations.

## **Strategic planning of participation**

From the outset, participatory strategies should be co-created with local stakeholders and reflect the diversity of user needs and territorial contexts. SINFONICA implemented this through the definition of local Groups of Interest (GOI) and preliminary co-creation workshops, leading to tailored engagement formats. Flexibility and context sensitivity proved essential to ensure inclusion, especially for digitally excluded or vulnerable groups.

## **Methodological coherence and diversity**

A mix of methods—interviews, focus groups, and workshops—was used to reach approximately 4,900 individuals across Europe. Activities were guided by the four A's framework (Accessibility, Availability, Affordability, Acceptability), offering a structured yet adaptable lens for engagement. Particularly for large-scale demonstrations, triangulating data from multiple qualitative tools enhances the robustness of findings.

## **Evaluation as an integral process**

SINFONICA's Evaluation Framework assessed the participatory approach across three key phases: Design and Planning, Implementation, and Results and Impacts. This allowed for the real-time refinement of methods and ensured alignment with stakeholders' evolving needs. Evaluation must not be treated as a retrospective activity but as an embedded component that supports responsiveness and transparency throughout the process. All guidelines for conducting the interviews, focus groups and workshops are given within the project deliverables and open access strategy. Therefore, this material can be used also for implementation of other large scale CCAM projects. In addition, the deliverable on the co-creation processes (SINFONICA D3.2) is recommended as a basis for adaptive development and evaluation of services.

## **Key recommendations on participatory approach for large-scale demonstration projects**

- Embed participatory design from the planning phase, ensuring user voices influence not just communication but also operational decisions (e.g., routing, interface design, accessibility features).
- Use structured but flexible evaluation tools (e.g., co-created feedback forms, facilitated reflection and focus groups) to monitor inclusivity, satisfaction, and trust during the entire demonstration.
- Co-design engagement formats with local stakeholders to adapt to language, cultural, and infrastructural differences.
- Develop clear feedback loops, showing participants how their input influenced the project, thus fostering trust and longer-term engagement.
- Document and disseminate participatory outcomes as a formal part of project deliverables to influence local and EU-level policymaking.

The SINFONICA experience underscores that meaningful participation is not only ethically necessary but functionally indispensable for the deployment of socially robust CCAM solutions. Integrating co-creation and evaluation into the core architecture of large-scale demonstrations strengthens both the technical deployment and the legitimacy of future mobility systems.

## 5. Communications

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This section provides recommendations for communication around CCAM services to three target audiences:

- (potential) Users
- Citizens
- Policy Makers

### 5.1 Communicating with (potential) users

#### **Recommendations on assistance systems**

Data from co-creation workshops and focus groups in SINFONICA D3.3 underline that physical presence of assistance — especially during transition phases toward automation — is essential. Participants with reduced mobility, older users, and visually impaired individuals emphasized the reassurance and trust generated by human support, even when the system is fully automated. CCAM services should thus ensure either onboard or remote assistance, particularly during boarding, disembarking, or service interruptions. It should be also noted that even users without accessibility needs may require support in an emergency / unexpected situation.

Hybrid models, combining automated services with human support (e.g., remote operators accessible via intercom), are considered effective transitional solutions. Although care needs to be taken around technology choices as they may be more suited to certain groups or situations. It may be that unstaffed vehicles require multiple solutions (or fallbacks such as an emergency mobile phone / app contact mechanism).

#### **Access to information**

Information must be clear, multi-sensory, multimodal, and context-adapted. The data collected during the SINFONICA participatory sessions revealed that many users—especially those with cognitive or sensory impairments—struggle with dense text or overly technical terminology. As such, layered information strategies should be implemented: using symbols, plain language, audio support, and video content to allow users to choose their preferred level of detail. Moreover, real-time updates (e.g., delays, re-routing) should be displayed in accessible formats both onboard and at stops/stations and ideally pushed to users via accessible mobile apps or voice systems.

#### **Staff training**

Training of CCAM-related staff (technical, support, and remote personnel) must go beyond technical skills and include soft skills in communication and disability/vulnerability awareness. According to SINFONICA D3.3, many users reported negative experiences with public transport staff who lacked understanding of invisible disabilities or neurodiverse communication styles. Training modules should be co-developed with users, and regularly updated based on lived experiences, ensuring respect, empathy, and adaptive communication (e.g., not assuming all wheelchair users require help).



Furthermore, comprehensive preparation is essential to prevent the emergence of negative attitudes toward new technologies or resistance to change, so training can help staff make passengers aware of some of the benefits of CCAM technology.

### **Communication during emergencies**

Emergency protocols must be designed with universal communication in mind. Users expect automated vehicles to provide clear, calm, and multisensory alerts in case of incidents, including visual displays, vibration cues, and audio messages in multiple languages. Participants to the engagement sessions also stressed the importance of redundancy: users must have at least two ways of receiving emergency instructions. Moreover, users asked for direct two-way communication with an operator (not just pre-recorded messages) during emergencies to gain reassurance and support tailored to their needs.

### **Passenger identification technologies**

AI can be used to identify passengers with certain needs. This can be a useful tool but also raises privacy concerns, and people might not wish to be “identified” as having specific needs by such technology, based on their look, profile or behaviour. Even with something clearly identifiable by AI, such as a person in a wheelchair: these users have different needs (some wheelchair users are quite autonomous and mobile, not requiring help or wishing to be treated differently, others are more reliant on assistance).

The system should prioritise voluntary self-identification, allowing users to select their preferences or needs via apps or terminals in advance or anonymously when boarding. Transparent privacy policies and opt-in mechanisms are essential.

### **User involvement in design**

One of the strongest messages of the SINFONICA project is the importance of ongoing user involvement. Communication strategies must not be static: they should evolve with continuous feedback loops, involving diverse users — including persons with disabilities, older adults, and digitally excluded groups — in testing messages, evaluating interfaces, and validating signage. Co-creation sessions showed that even small design decisions (e.g., button placement, icon shape, or colour contrast) significantly affect comprehension and comfort. Therefore, communication tools and content should be co-designed and iteratively improved with representative users throughout the life cycle of CCAM services.

CCAM services must be built with accessibility, affordability, and ease of use as core design principles — not add-ons. Engage vulnerable groups early to avoid exclusion by design.

## **5.2 Communicating with citizens**

In order to engage citizens when implementing CCAM services, it is important to raise awareness and acceptance not only for the people who might use the services, but also for the public and other stakeholders. Increasing awareness and confidence among the citizens can be reached by several methods, which are described below. For all strategies, it is important to promote the benefits of

using CCAM and actively break down prejudice (e.g., data privacy concerns and fear of hackers, security concerns).

Engagement should not only be with adults. The next generation of transport users will have different attitudes towards technology, growing up in tech-heavy environment. Educational activities involving children in schools are recommended. Children are generally highly receptive to new ideas, and their enthusiasm often extends to their families, thereby fostering broader community engagement and awareness.

### **Promotion and advertisements**

In communication to the public (social media, official newspapers), existing and upcoming CCAM services have to be promoted in a visually appealing way. Branding should be complementary to the existing public transport services but also make users aware of the automation. Also, the public spaces at bus stops or community buildings can be used for promoting CCAM services. With that, the upcoming or existing benefits, like more reliable services, more frequent line services, have to be promoted. Experts in communication, design and marketing should be consulted regarding efficient strategies and design aspects.

Care needs to take place to ensure users are aware and not confused by the capabilities and scope of automated / semi-automated and remotely controlled vehicles. It should be noted that the UK is currently consulting on enabling legislation related to the Automated Vehicles Act around ensuring terminology such as Driverless or Automated are only used in permitted circumstances. This could be a model for other countries / regions, although we recommend where possible this is standardised at EU / National level.

### **Demonstrations and roadside testing**

A more convincing, but also more expensive method is to implement demonstrations and roadside testing free of use. In the past, this strategy of offering free services with, for instance, automated shuttles have shown to provide very good results regarding the acceptance of the public. With these free services, explanations of the technology and services should be given, too. It would be possible to instruct the operator who is often still needed, to also be confident in making public advertisements for the new services and explain its' functionalities. Showing the technology and services to the public should also be done when having public events like community festivals or holiday festivities. In these cases, positive experience can be gained.

### **Human service personnel**

In general, it is advisable to have human service personnel when transitioning to automated and connected mobility to communicate with passengers and explain the services. As shown in SINFONICA's workshops and focus groups, the wish for "helping people" from the transport providers is given. They give guidance and information in unknown circumstances.

For larger vehicles or ones travelling at higher speeds, on-board staff is essential.

## **Communication & press**

Another aspect in communicating to citizens is, of course, the press. When new CCAM services are tested and/or implemented, they can help to spread the information and increase trust and acceptance. Importantly here, is to also offer free trials and testing to reduce concerns within the press, too.

Targeted communications campaigns should be used to inform the public about the benefits of automated vehicles / CCAM public transport and to convince those who are open to the idea. This can emphasise real benefits for potential customers, such as flexibility, security and convenience.

It is important to consider potential users with no bank account, no internet connection, etc. Also children, e.g. travelling to/from school.

## **No one-size-fits-all**

A major advantage of CCAM and how it could revolutionise public transport is the possibility to account for different kinds of mobility challenges. As shown in SINFONICA's focus groups, workshops and surveys, most of the citizens report the wish of having no one-size-fits-all approach, but rather having adaptive services being tailored to the needs of different people (see deliverable 3.1 for insights of the GOIs). This feature should be promoted very effectively, as this will help in communicating to the public.

## **Increasing awareness and confidence**

In areas where CCAM trials have operated, awareness of their existence has generally been quite high, but actual ridership/experience lower. Higher visibility trials are needed, but also services which are useful to larger numbers of everyday travellers, rather than concentrating on niche services. A highly visible staff presence, at least in the trial or early stage of a service, helps passenger confidence. Training and familiarisation sessions with users with specific needs (blind or partially sighted, wheelchair users, etc.) are also important, as they are on traditional public transport vehicles.

## **Clarity on benefits**

CCAM should never be presented as a way to cut staff or save money. Rather, it is a catalyst for expanded service provision without extra recruitment, given driver shortages in much of Europe. It can fill gaps, including in towns, rural areas and peri-urban areas of smaller cities, by providing public transport where none existed previously, or by augmenting existing public transport services.

Road safety is a potential benefit, as well as longer or more flexible operating hours, as with automated vehicles there will no longer be a need to respect drivers' hours and rest periods. This means vehicle utilisation can also be higher, leading to greater efficiencies.

Reduced human dependence (e.g. driver availability) can also mean greater reliability, once the technology used is proven to be robust and reliable.

Whilst security (or lack thereof) can be seen as a drawback of CCAM, the right planning, technology and operation could in fact make security a benefit. Cameras on vehicles can help them become

“safe areas”, even for people not intending to travel, they can seek refuge in an automated vehicle if threatened, as they would be under surveillance and able to speak with an operator. Building trust with a good onboard response system can help users feel safe and tackle problems like sexual harassment.

### **Promoting active participation and managing concerns**

The concept of CCAM is often met with a combination of curiosity, interest, and scepticism. Active participation in co-design, as well as testing and providing feedback on the vehicles, infrastructure and services, is important in terms of dispelling myths and false information, while also building trust. It enables public authorities, operators and manufacturers to take on board comments and address concerns.

Public authorities and operators should openly address public fears and hesitations regarding CCAM, especially regarding safety, using transparent and accessible communication.

### **5.3 Communicating with policymakers**

There are different types of benefits arising from the involvement and communication with policy makers. The following summarises the type of benefits by category of policy makers both at local/national and international level.

- Local policy makers:
  - Benefits: Trial access, smart infrastructure, citizen trust
- National policy makers:
  - Benefits: Legal framework, public investment, planning
- EU and international policy makers:
  - Benefits: Standardisation, cross-border operation, EU funding.

#### **Policy makers at local level**

Local policymakers can enable real-world deployment by embedding CCAM into city mobility policies. Due to the subsidiarity principle, according to which social and political issues should be dealt with at the most immediate or local level that is consistent with their resolution, local policy makers (for example, local administrators) should be the one dealing with social inclusivity aspects, due to their proximity with people needs and requirements.

Local policy makers can in principle make sure that CCAM trials integrate with:

- Local Public transport systems (for the set-up of MaaS platforms).
- The definition of inclusive Sustainable mobility plans (SUMP), involving local NGOs, users, citizens associations in the process.

Local (and national) policymakers are also conducive to enabling physical and digital infrastructure upgrades: smart traffic signals, edge computing nodes, 5G deployment, etc, can be adapted to local users’ needs and mobility patterns. They can also prioritize urban or highway corridors for CCAM trials, supporting logistics, commuting, or cross-border mobility.

## Policy makers at national level

The importance in the involvement and communication with policy makers at national level stands in the definition of framework for investment and planning of CCAM services, specifically at national border CCAM projects, when technological innovations are applied along multiple cross-border corridors and urban trial sites.

For example, the 5G-MOBIX trial 2 between Greece and Turkey has involved both national governments for infrastructure harmonization and technology providers, both challenging connectivity requirements, especially in a cross-border context, where 5G technology deployment may be slower than in densely populated urban centres.

National policy makers can in principle make sure that CCAM trials integrate with:

- Access to public funding and procurement. Policy involvement opens doors to national investment programs, recovery funds (e.g., PNRR in Italy), and innovative public procurement.
- Policy support ensures CCAM contributes to long-term public value, not just private tech innovation. National policy makers can align CCAM services with long-term and broader objectives:
  - Green Deal / climate targets.
  - Digital transition strategies.

## Policy makers at international level

International policy makers (basically EU policy makers) are not only important as a key funding source for CCAM trials and demonstrations through EU programs, e.g. Horizon Europe, CEF (Connecting Europe Facility), Digital Europe Programme.

They also play a fundamental role in providing harmonised rules and legal certainty. For example,

- Clear rules for testing and deployment (e.g. AV testing, V2X communication protocols, liability frameworks).
- Avoids legal ambiguity, which is a major barrier to private sector investment.
- Harmonised laws across regions (e.g. EU-wide standards) reduce cross-border friction in trials and operations.

Besides, international (and national) policy makers also drive:

- Interoperability standards (e.g. C-ITS, C-V2X).
- Mutual recognition of vehicle certification.
- Data-sharing and governance protocols.

For example, The EU support for the “EU-wide Deployment of Cooperative ITS” (C-ITS) and further modifications<sup>3</sup> ensure V2X technology can work across countries. The new Directive was adopted on

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<sup>2</sup> <https://www.5g-mobix.com/>

<sup>3</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023L2661>



22 November 2023, with the aim to adapt to the emergence of new road mobility options, mobility apps and connected and automated mobility.

## 6. Conclusions

The following tables are checklists summarising the SINFONICA guidance and recommendations for user-centric CCAM-based public and shared transport services:

Table 1 – Guidance for CCAM implementation

Topic	What?	Who?
<b>Public transport integration</b>	<p>Same “look and feel” as the rest of the public transport system.</p> <p>Clear advance information on vehicle type (if staffed or not, etc.)</p> <p>Frequency, speed and service amplitude (first and last services, days of the week operated) should be as for a “normal” service, to attracting different kinds of users and fulfil a variety of needs.</p> <p>Connections with other modes/services.</p>	<p>Policy makers (or project coordination, in the case of a demonstration project).</p> <p>Transport authority.</p> <p>Transport operator.</p>
<b>Ticketing and fares</b>	<p>Different payment options.</p> <p>No requirement for online account or smartcard.</p> <p>Validation of passes and season tickets.</p> <p>Fare structure the same as for other local public transport services (flat fare, distance-based or zonal), with no premium.</p> <p>A free fare might be appropriate for very short-distance shuttles, otherwise usage might be low. But depends on funding, operator and business case.</p>	<p>Transport authority.</p> <p>Transport operator.</p>
<b>Booking</b>	<p>Different options to book in case of DRT (not only online).</p> <p>Acceptance of last-minute bookings and changes.</p> <p>May require the availability of more vehicles (perhaps not all CCAM-enabled) in order to satisfy peak demand or conflicting bookings.</p> <p>Reliability is important for the passenger: if a booking cannot be honoured, or if a later alternative is offered, it might cause them to miss an appointment or long-distance transport connection.</p>	<p>Transport authority.</p> <p>Transport operator.</p> <p>MaaS provider/broker.</p>
<b>Vehicle type and configuration</b>	<p>Consider peak travel periods if proposing small vehicles. As an alternative to procuring full-size CCAM vehicles, traditionally driven full-size buses could be used at peak times / on trunk routes, supplemented by</p>	<p>OEMs.</p> <p>Transport authority.</p> <p>Transport operator.</p>

Topic	What?	Who?
	<p>automated minibuses at off-peak times or on peripheral routes.</p> <p>Depending on the speed of the vehicle (especially if outside urban areas), seated passengers only (possibly with seatbelt requirements) may be appropriate.</p>	
<b>Staffing</b>	<p>CCAM should not be a reason to remove staff, but to redeploy staff in different roles (more customer-facing).</p> <p>Staff are essential in larger vehicles and at higher speeds, mainly for passenger security and peace of mind (consider that not all passengers might respect the rules; these people cannot be allowed to stop and disrupt the journey for other passengers).</p>	Transport operator.
<b>Funding</b>	<p>Develop multi-stakeholder collaborative funding models for initial vehicle, infrastructure and data platform costs</p> <p>Need to consider costs related to iterative development and testing (including lab and closed track testing)</p> <p>Automated vehicles need funding for specialist operations and maintenance</p>	<p>Project management/ evaluation team.</p> <p>Transport authority and operator.</p>

Table 2 – Additional guidance for CCAM demonstration projects

Topic	What?	Who?
<b>Route/site selection</b>	<p>Provide a service that is close as possible or exceeds existing public transport service</p> <p>Allows mixture of automated and manually driven vehicles (which allows a service to be maintained even if the automation demonstration is temporary)</p> <p>Consider different kinds of CCAM services including higher traffic speeds and busy areas</p>	<p>Project management/ evaluation team.</p> <p>Transport authority and operator.</p>
<b>Ticketing and payment</b>	<p>Ticketing and payment services should be identical to that of the rest of the public transport network</p> <p>A variety of payment options (online, contactless, smartcard, cash).</p> <p>If services are free, stimulate a payment system to gauge public interactions.</p> <p>Fares no higher or equivalent to other local public transport (or for shared taxis, equivalent fares to normal taxis)</p>	<p>Project management/ evaluation team.</p> <p>Transport authority and operator.</p>

Topic	What?	Who?
<b>Measurement and evaluation</b>	Goals and objectives should be developed through participatory co-creation strategies Evaluation needs to be an integral part of the process and considered from the start Utilise flexible evaluation tools	Project management/ evaluation team.

Table 3 – Guidance for communication and information

Topic	What?	Who?
<b>Assistance systems</b>	Physical presence of assistance systems are essential to enable to transition to automated systems. Hybrid approaches (mixture of technologies / staff) may be required including fallback solutions	OEMS, Transport Operators, Transport Authorities, System Providers
<b>Passenger information</b>	Information must be clear, multi-sensory, multimodal, and context-adapted Avoid dense text or overly technical descriptions	OEMS, Transport Operators, Transport Authorities, System Providers
<b>Personnel and staff training</b>	Must go beyond technical skills and include soft skills in communication and disability/vulnerability awareness	OEMS, Transport Operators, Transport Authorities, System Providers
<b>Emergency communication</b>	Designed with universal communication in mind Provide clear, calm and multisensory alerts in event of incidents	OEMS, Transport Operators, Transport Authorities, System Providers
<b>Passenger identification technologies</b>	Can be a useful tool but privacy concerns must be managed Care must be taken not to assume that all users of the identified group have the same needs	OEMS, Transport Operators, Transport Authorities, System Providers
<b>Promotion and communication of benefits</b>	CCAM services should be branded in a visually appealing way Branding should be complementary to the existing public transport services but also make users aware of the automation Ensure the public are clear on the capabilities and functions of automated vehicles	Transport Operators, Transport Authorities, System Providers
<b>Demonstration and testing</b>	Consider whether services should be free to help adoption Utilise public events like community or holiday festivals to showcase the service / technologies	Transport Operators / Transport Authorities

Topic	What?	Who?
	Advisable to include human personnel (at least at start of services / during transition period)	

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