Interreg North-West Europe

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CAMINO

PTA BUDGET AND RESOURCES GUIDE FOR AMOD DEPLOYMENT D.1.3.2

Link to Camino Website

PROJECT ACRONYM:

CAMINO

PROJECT TITLE:

Blueprinting Automated Mobility on-Demand Deployment for Sustainable Public Transport

PROGRAMME PRIORITY:

Smart and just energy transition

SPECIFIC OBJECTIVE

2.1: Promoting energy efficiency and reducing greenhouse gas emissions

DELIVERABLE NUMBER AND TITLE

D.1.3.3 - PTO Budget and Resources Guide For AMoD Deployment

WORK PACKAGE NUMBER AND NAME:

Work package 1 - Developing AMoD deployment strategies for PT that stimulate a modal shift and reduce GHG emissions

ACTIVITY NUMBER AND NAME:

Activity 1.3 - Preparing PTAs and PTOs for AMoD deployment in NWE

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01 EXECUTIVE SUMMARY

INTRODUCTION & DEFINITION OF AMOD

AMoD (Automated Mobility on Demand) is the name of independently driving vehicles for public transport. Rather than relying on traditional bus routes with drivers and timetables, AMoD offers efficiency and reliability. Automated buses only operate when a journey is requested, picking up passengers and stopping only at the locations required.

There have been multiple automated transport projects in Europe over the last twenty years. The first such project, named ParkShuttle, began operating on a dedicated lane, separated from traffic, in the Netherlands in 1999. This fully automated bus connects a metro station in Rotterdam with a remote business park. Every day, 1,850 passengers use this system. During peak hours, the ParkShuttle operates on a fixed timetable, running every 2.5 minutes. Outside of these times, it operates on demand. You must reserve online at least 15 minutes before you wish to use the service.

In the long term, automated mobility could form the core of public transport networks in Northwest Europe. It will ensure the future reliability, sustainability and profitability of the network. The network will be less vulnerable to disruption due to staff shortages. Around 60% of the total costs of a public transport network consist of labour costs. Without drivers on every vehicle, the profitability of a network would rise substantially. Another benefit of introducing AMoD is that it provides first and last-mile options for servicing low-density neighbourhoods. These areas cannot always be connected cost-effectively to classical city networks with a high service level. AMoD with small, on-demand shuttles can fill this gap and provide an acceptable level of service at an acceptable cost.

ABOUT THIS GUIDE

As part of the Interreg NWE Project CAMINO, the public transport authority (PTA) Almere was responsible for creating a guide on automated mobility on demand. The guide is intended to help PTAs define, design and evaluate potential AMoD use cases. Based on a detailed analysis of the Almere Hout use case, it provides a broader overview of AMoD deployment scenarios. It considers service designs and local mobility needs, and provides practical advice on integrating AMoD into strategic plans.

02 PTA'S RESPONSIBILITIES

GENERAL RESPONSIBILITIES

The Public Transport Authority (PTA) is responsible for planning, organising, and overseeing public transport within a region. Its duties include developing an efficient and sustainable transport network, managing finances, and aligning services with regional mobility and environmental goals. The PTA integrates various modes of transport, sets service standards, and conducts competitive tendering to select qualified operators. It also oversees customer service, fare systems, infrastructure maintenance, and the adoption of digital tools to improve user experience. Through strategic planning and coordination, the PTA ensures that public transport meets the needs of the community.

RESPONSIBILITIES FOR AMOD

The PTA plays a leading role in guiding and coordinating the integration process when introducing AMoD services. Its responsibility is to ensure that these new services align with the region's broader objectives, such as enhancing accessibility, minimising environmental impact, and fostering a well-connected transport system. This involves establishing clear rules and performance standards, ensuring that AMoD services operate seamlessly alongside existing public transport and facilitating data sharing between different providers. The PTA also helps to plan the operation of AMoD services, oversees funding and tendering processes, and monitors pilot projects to ensure they are safe, fair, and sustainable. By working closely with public and private partners, the PTA ensures that AMoD becomes a useful and inclusive part of the overall transport network.

03 RESOURCES NEEDED

Integrating an AMoD service into the public transport system requires specific resources across staffing, technology and operations, to ensure safe and effective service delivery.

Financial Resources:
The PTA is responsible for securing funding for planning, pilot programs, infrastructure upgrades, and long-term service implementation. This includes budgeting for subsidies, public-private partnerships, and investment in digital systems.

Regulatory and Legal Frameworks:
Developing or adapting regulations to govern AMoD operations is important. This includes safety standards, data governance, accessibility requirements, and integration rules with other transport services.

Physical Infrastructure:
The PTA may need to plan and upgrade infrastructure to support AMoD, such as designated pick-up/drop-off zones, charging stations for electric vehicles, and road or signage modifications for automated navigation.

04 COST OF AMOD FOR PTAS

When implementing an AMoD service, it is essential to account for a range of costs, typically divided into two main categories: Capital Expenditure (CAPEX) and Operational Expenditure (OPEX). CAPEX includes the initial investments required to launch the service, such as the purchase of automated vehicles and any necessary infrastructure adaptations (e.g., charging stations, road modifications). OPEX refers to the ongoing, recurring costs associated with daily operations, which are typically borne by the Public Transport Operator (PTO). This includes expenses such as vehicle maintenance, insurance, energy consumption, and staffing.

The list outlines the full range of cost components associated with AMoD deployment. However, given that there are currently no fully operational AMoD services on public roads in Europe—and that deployment approaches vary significantly by country—no standardised cost estimates are available at this time. Actual costs will depend on factors such as the choice of technology, the provider, national regulations, and the size and scope of the vehicle fleet.

CAPEX
Vehicle Purchase
Vehicle Set up and Testing
Charging Stations
Infrastructure Modifications
OPEX
Operator Training
Safety Operator (on-site)
Safety Operator (remote)
Maintencance
Insurance
Parking
Electricity Charging

Table 1: CAPEX & OPEX

The responsibilities and costs for a PTA can vary depending on the regulations and ownership structure of each mobility tender. Typically, the PTA is not directly responsible for the upfront costs of implementing AMoD, such as vehicle acquisition or technology development.

However, they are accountable for funding necessary adjustments to the existing infrastructure, ensuring it can support the operation of AMoDs. Additionally, the PTA usually pays a fixed amount for each kilometer the automated vehicles operate, covering ongoing operational costs and contributing to the overall service delivery. The PTA is also responsible for assessing the performance of the system, evaluating whether it meets the expected objectives and effectively addresses the mobility needs of the public, ensuring that the service is both useful and successful. These responsibilities ensure that the PTA plays a key role in enabling the integration of AVs into the public transport network while managing operational efficiency and ensuring the system's long-term viability.

05 IMPLEMENTATION PLAN FOR PTAS

PHASE 1: SET OBJECTIVES AND ASSESS FEASIBILITY

Define what role AMoD should play in the regional transport system—such as improving first/last mile connectivity, reducing car dependency, or serving low-demand areas. Conduct feasibility studies to examine local demand, road conditions, technology readiness (e.g. AV capabilities), and regulatory gaps. Identify suitable use cases and target user groups.

PHASE 2: STAKEHOLDER ENGAGEMENT AND LAUNCH OF TENDER

Start by bringing together key stakeholders—such as local authorities, public transport operators, technology providers, and infrastructure managers—to ensure everyone is aligned on the goals and expectations for AMoD services. Open discussions help identify local needs, potential challenges, and opportunities for collaboration. Once there's a shared understanding, the PTA can prepare and publish a tender to find suitable service and technology partners. The tender should clearly explain what the service should look like, how it will connect with existing transport, and what standards and rules providers must follow.

PHASE 3: PREPARE INFRASTRUCTURE AND DIGITAL SYSTEMS

Identify where new or upgraded infrastructure is needed—such as AMoD-compatible streets, pick-up/drop-off zones, and charging stations. Plan for seamless integration with existing mobility services through apps, Mobility-as-a-Service (MaaS) platforms, and unified payment systems. Ensure digital infrastructure allows for real-time data exchange and system monitoring.

PHASE 4: EVALUATE AND SCALE UP

Analyze results of the first pilots by using key performance indicators (e.g. usage rates, modal shift, emissions reduction, service reliability). Use the findings to refine the service design, adjust regulations, and plan a gradual scale-up to other areas. Integrate AMoD into the regional transport plan to ensure long-term sustainability and alignment with public mobility goals.

06 CONCLUSION

Integrating AMoD services marks a significant change in how public transport systems can address the evolving urban and regional mobility requirements. For PTAs, this transition is not just a technological upgrade, but also a strategic opportunity to make mobility systems more inclusive, flexible and environmentally sustainable.

PTAs are increasingly becoming innovators as well as service regulators. By taking on responsibilities such as defining the regulatory landscape, managing infrastructure upgrades, ensuring digital interoperability and coordinating with public and private stakeholders, PTAs are at the heart of this mobility transformation.

Financially, AMoD systems introduce new cost structures and uncertainties. However, with careful budgeting and phased implementation, PTAs can address these challenges while realising long-term benefits in terms of accessibility, emissions reductions, and system efficiency. While upfront costs may not fall entirely on the PTA, the responsibility for integration, oversight, and performance evaluation remains firmly in their hands.
The phased implementation plan offers a realistic roadmap, covering everything from goal-setting and stakeholder engagement to infrastructure readiness and service scaling. Each phase emphasises the importance of inclusivity, public–private cooperation, and evidence-based decision-making.

Ultimately, adopting AMoD services means making a strategic commitment to future-proofing public transport. If executed with foresight and inclusiveness, AMoD has the potential to enhance mobility equity, reduce car dependency and support broader urban sustainability goals. PTAs have the opportunity to spearhead this evolution, ensuring that innovation

07 FURTHER READING

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