Interreg
North-West Europe

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CAMINO

JOINTLY DEVELOPED LONG-TERM AMOD IMPLEMENTATION STRATEGIES FOR PTAS IN NORTH WEST EUROPE OUTPUT 1.1

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

OUTPUT NUMBER AND TITLE

Output 1.1 - Jointly developed long-term AMoD implementation strategies for PTAs in North West Europe

PROGRAMME OUTPUT INDICATOR

2.1.O.1: Strategies and action plans jointly developed

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01 EXECUTIVE SUMMARY

As part of the CAMINO project, the project partners (PPs) jointly developed a long-term deployment strategy for automated mobility on demand (AMoD) services, targeting public transport authorities (PTAs) across North-West Europe (NWE). This strategy summarises all the work carried out during the project from the PTA Almere, which provides PTAs with a tailored framework to support the design, evaluation and integration of AMoD solutions into existing public transport systems.

The strategy provides PTAs with practical guidance and tools to enhance the accessibility, affordability and environmental performance of their services. By facilitating the seamless adoption of AMoD, the strategy contributed to CAMINO's overarching objective of reducing reliance on private cars and reducing transport-related emissions in NWE, while promoting a more sustainable and inclusive mobility landscape.

02 WHY PTAS SHOULD INVEST IN AMOD

Public Transport Authorities should invest in AMoD to secure the sustainability, accessibility, and reliability of their networks. As budgets remain under pressure and labor shortages continue to undermine service quality, AMoD offers a viable path to maintain and expand public transport coverage—especially in underserved, low-density neighborhoods—without proportionally increasing costs. Implementing AMoD aligns with long-term urban development and mobility goals by improving first- and last-mile connectivity, thus fostering greater public transport use and reducing car dependency. By initiating AMoD pilots and integrating automation into upcoming concession frameworks, PTAs can guide the evolution of mobility systems while sharing innovation risks and benefits with operators.

03 POLICIES AND REGULATIONS (NL)

In the Netherlands, the regulatory framework for automated vehicles (AVs) is led by the Ministry of Infrastructure and Water Management (IenW) and the RDW (National Vehicle Authority). The RDW oversees the approval and safety compliance of AVs, ensuring they meet national and EU regulations for testing and deployment, including controlled pilot permits.

Regional authorities, such as the Province of Flevoland, are responsible for approving infrastructure adaptations and co-financing AV-related projects—such as smart traffic systems and charging stations.

Municipalities, like Almere, manage the local integration of AMoD services. This includes aligning with national policies on sustainable transport, adapting infrastructure, and ensuring public accessibility in areas like Almere Hout.

Supporting bodies such as DOVA and CROW provide legal guidance, technical standards, and planning tools to ensure AV deployment is safe, inclusive, and aligned across all levels of government.

04 STAKEHOLDER MAPPING

Effective stakeholder mapping is essential for developing AMoD services. It helps identify key players, align their perspectives, and foster collaboration to meet policy goals and community needs.

Internal stakeholders
Almere's internal stakeholders include the City Council and Aldermen, supported by City Planning, Finance, Legal, and Road Safety departments. Additionally, the Public Transport Team is an initiator and decision maker for public transport in Almere. These internal stakeholders serve as the main decision-makers and oversee the implementation of AMoD services within the city's jurisdiction.

External stakeholders
External stakeholders encompass national authorities such as the RDW and the Ministry of Infrastructure, regional partners like the Province of Flevoland, and public transport operators. Additionally, user advocacy groups (such as ROVER) and knowledge platforms (like CROW) contribute valuable expertise and community perspectives. This collaborative ecosystem helps align AMoD services with regulatory, technical, and community needs.

05 IMPLEMENTATION STRATEGY

For Almere to implement AMoD effectively, a structured and forward-looking approach will be required. The city will need to:

Define Strategic Goals for AMoD
Almere must clarify how AV services will address urban challenges such as last-mile gaps, low-density area coverage, and climate targets. These goals will guide all subsequent design and procurement processes.

Develop a Scalable Pilot Framework
The city will need to define technical and operational parameters for pilots, including routing logic, safety protocols, and user interaction design, with a focus on replicability and interoperability.

Integrate AVs into the 2028–2037 Tender
Almere must design its upcoming concession to include flexible AV modules, performance metrics, and incentive schemes that encourage operators to adopt and expand AMoD offerings.

Prepare the Legal and Regulatory Basis
The municipality will need to work closely with RDW and national ministries to secure testing exemptions, legal clarity on AV liability, and operational licenses.

Engage the Community Early
Almere will have to build trust and awareness among residents through participatory design workshops, test ride opportunities, and transparent communication about safety and benefits.

Build Institutional Capacity
Municipal staff will need training in AV-specific planning, procurement, and risk management to effectively oversee the new technology and its integration.

06 FINANCIAL INVESTMENT

PTAs are responsible for key financial commitments that enable the successful deployment and integration of AMoD services. These investments can be structured into four main categories:

1. **Infrastructure Development**
   - Upgrading roadways to be AV-compatible
   - Installing charging stations for electric AV fleets
   - Creating designated pick-up/drop-off zones
2. **Digital Integration**
   - Implementing real-time data platforms
   - Integrating AMoD into existing ticketing and Mobility-as-a-Service (MaaS) systems
   - Ensuring cybersecurity and data governance
3. **Operational Enablement**
   - Funding feasibility studies and impact assessments
   - Supporting regulatory framework development and safety oversight
   - Overseeing pilot programs and evaluating service performance
4. **Service Funding Models**
   - Structuring public-private partnerships
   - Providing fixed-per-kilometre subsidies to PTOs for AV operation
   - Allocating budgets for inclusive access and system monitoring

These financial investments ensure AMoD services align with long-term transport policies focused on sustainability, efficiency, and social equity, while leveraging innovation to address future mobility needs.

07 SUCCESS CRITERIA

The success of the PTA's AMoD deployment will be measured by improved accessibility in underserved areas. In Almere's case, this will particularly focus on Almere Hout. The deployment will also ensure service quality and operational efficiency while maintaining legal compliance.

Key indicators include:

- Ridership levels
- Reduction in travel time
- User satisfaction
- Coverage radius (especially the "400-meter stop distance" benchmark)
- Integration with the BRT line M8
- Cost-effectiveness
- Serve mobility-impaired users

Successful pilots may lead to city-wide expansion of AV services within the next public transport concession.

08 RISK ANALYSIS

Almere faces several risks in deploying AMoD services, including regulatory uncertainty, low public acceptance, and technological limitations.

Regulatory Uncertainty:
The regulatory landscape for AVs is still developing, which could cause delays or additional compliance costs. To mitigate this, Almere is working closely with national regulators and staying ahead of upcoming regulatory changes.

Low Public Acceptance:
Public trust in AVs could be a barrier, with concerns over safety and reliability. Almere plans to address this through phased pilots, public education campaigns, and ensuring transparency about AV safety features.

Infrastructure Limitations:
Almere Hout, a low-density area, lacks the infrastructure needed to support AVs, such as smart traffic systems and charging stations. The PTA is planning infrastructure upgrades, including dedicated lanes and charging facilities, to support the smooth operation of AVs.

Technological Maturity:
The AV technology may not yet be fully mature, particularly in complex or adverse weather conditions. Almere will begin with lower-risk routes and gradually expand as the technology evolves and proves reliable.

Operational Risks:
Safety and reliability are key concerns, as AVs may face technical issues or breakdowns. Almere will use a small fleet initially, with safety operators or remote monitoring to ensure safe operation.

09 CONCLUSION

The implementation of AMoD represents a strategic opportunity for PTAs in North-West Europe to improve accessibility, reduce emissions, and enhance service delivery, particularly in low-density areas. As demonstrated in Almere, a clear implementation strategy is required: setting targeted mobility goals, embedding AV services into upcoming public transport concessions, securing legal clarity through collaboration with RDW and national ministries, and ensuring public engagement and trust through transparent communication and pilot testing. Financial investments—such as digital infrastructure, AV-compatible roads, and operational subsidies—must be aligned with long-term goals for sustainability and equity. Stakeholder mapping has proven essential in aligning internal city departments with external actors like regional authorities, technology suppliers, and user groups. Success will be measured through indicators such as improved stop accessibility, user satisfaction, integration with main transport lines, and cost-effectiveness. With this structured and collaborative approach, AMoD can transition from pilot to permanent public transport service within the next concession cycle.

10 FURTHER READING

Bösch, P. M., Becker, F., Becker, H., & Axhausen, K. W. (2018). Cost-based analysis of Autonomous Mobility Services. Transport Policy, 64, 76–91. https://doi.org/10.1016/j.tranpol.2017.09.005

de Séjournet, A., Rombaut, E., & Vanhaverbeke, L. (2023). Cost analysis of autonomous shuttle services as a complement to public transport. Transportation Research Procedia, 72, 2323–2330. https://doi.org/10.1016/j.trpro.2023.11.723

Deliverables. CAMINO. (n.d.). https://camino.nweurope.eu/deliverables

McKay, G. (2025, June 11). Goldman sees Autonomous Vehicles Transforming Insurance World. Insurance Journal. https://www.insurancejournal.com/news/national/2025/06/11/827020.htm

Bösch, P. M., Becker, F., Becker, H., & Axhausen, K. W. (2018). Cost-based analysis of Autonomous Mobility Services. Transport Policy, 64, 76–91. https://doi.org/10.1016/j.tranpol.2017.09.005

de Séjournet, A., Rombaut, E., & Vanhaverbeke, L. (2023). Cost analysis of autonomous shuttle services as a complement to public transport. Transportation Research Procedia, 72, 2323–2330. https://doi.org/10.1016/j.trpro.2023.11.723

Tran, B. (2025, May 14). Autonomous vehicles in public transport: How cities are adopting self-driving buses (latest data). PatentPC. https://patentpc.com/blog/autonomous-vehicles-in-public-transport-how-cities-are-adopting-self-driving-buses-latest-data#:~:text=The%20average%20cost%20of%20an,expenses%2C%20and%20lower%20maintenance%20costs.

Tran, B. (2025, May 14). Autonomous vehicles in public transport: How cities are adopting self-driving buses (latest data). PatentPC. https://patentpc.com/blog/autonomous-vehicles-in-public-transport-how-cities-are-adopting-self-driving-buses-latest-data#:~:text=The%20average%20cost%20of%20an,expenses%2C%20and%20lower%20maintenance%20costs.