

pendel

Transporting the future.

**Why did we create Pendel ?**

As a **one-stop shop**, Pendel provides an **all-inclusive** and **continuous** service for **autonomous transport**.



### **All-inclusive service**

From preparation, setup, to operation



### **Tech and service partners**

Reliable, leading industrial position



### **Proven track record**

Delivering 4+ projects by 2023



## Our deployments in 2022



### Port of Barcelona, Spain

Last mile from a parking lot to the World Trade Center



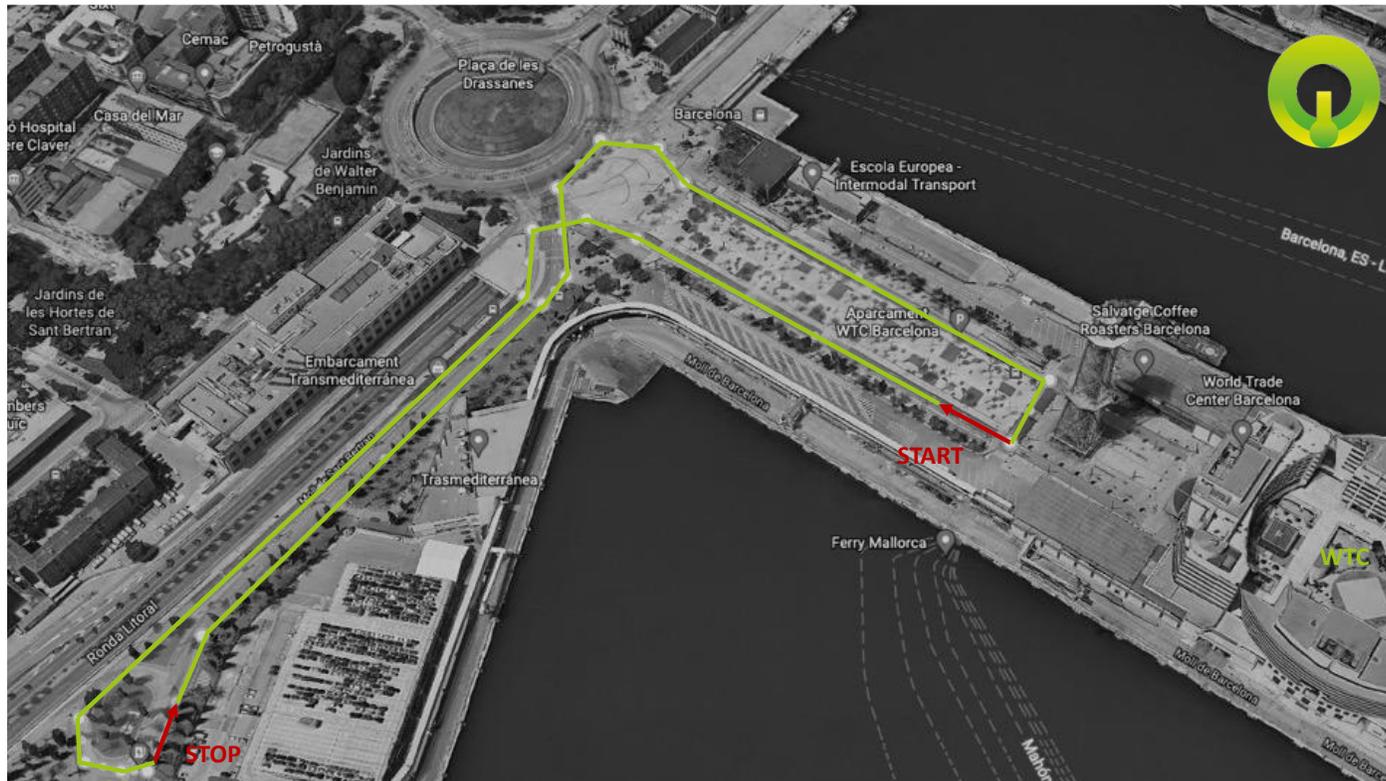
### Hannover Region, Germany

Last mile from a tramway station to a university campus, temporarily substituting a conventional large bus



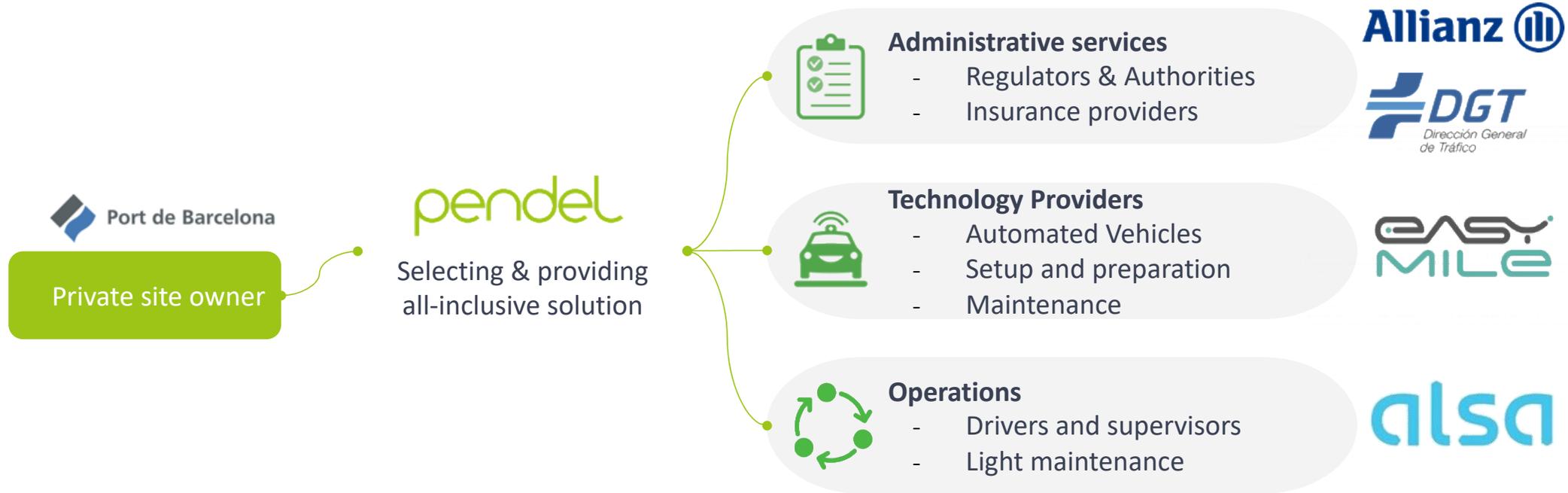
# The project at the Port of Barcelona

Deploy an autonomous shuttle in real-life conditions and understand the main regulatory and operational steps needed.



This project has received funding from the European Union's Directorate-General for Communications Networks, Content and Technology, 2020 Work Programme under grant agreement No. LC-01632937

# Stakeholders involved in preparing and operating



**Our main learnings from this pilot  
for the future of AV**

# 1. Overall, the technology works

## Trip time regularity

Standard deviation time of 1.09 minute calculated out of 375 trips. Main reason for delay was due to emergency stops and its “recovery time”.

## No accidents

The pilot maintained its transportation service during one month without any accidents.

## Users felt safe (seated)

Users had a positive perception of preventive emergency stops, but felt that the suddenness of stops presented a hazard when standing up.



## 2. We need to improve shuttles' operations

### Large amount of emergency stops (20-25/week)

Over 379 trips, 76 emergency stops were recorded.

### Manual mode to autonomous mode is "tough"

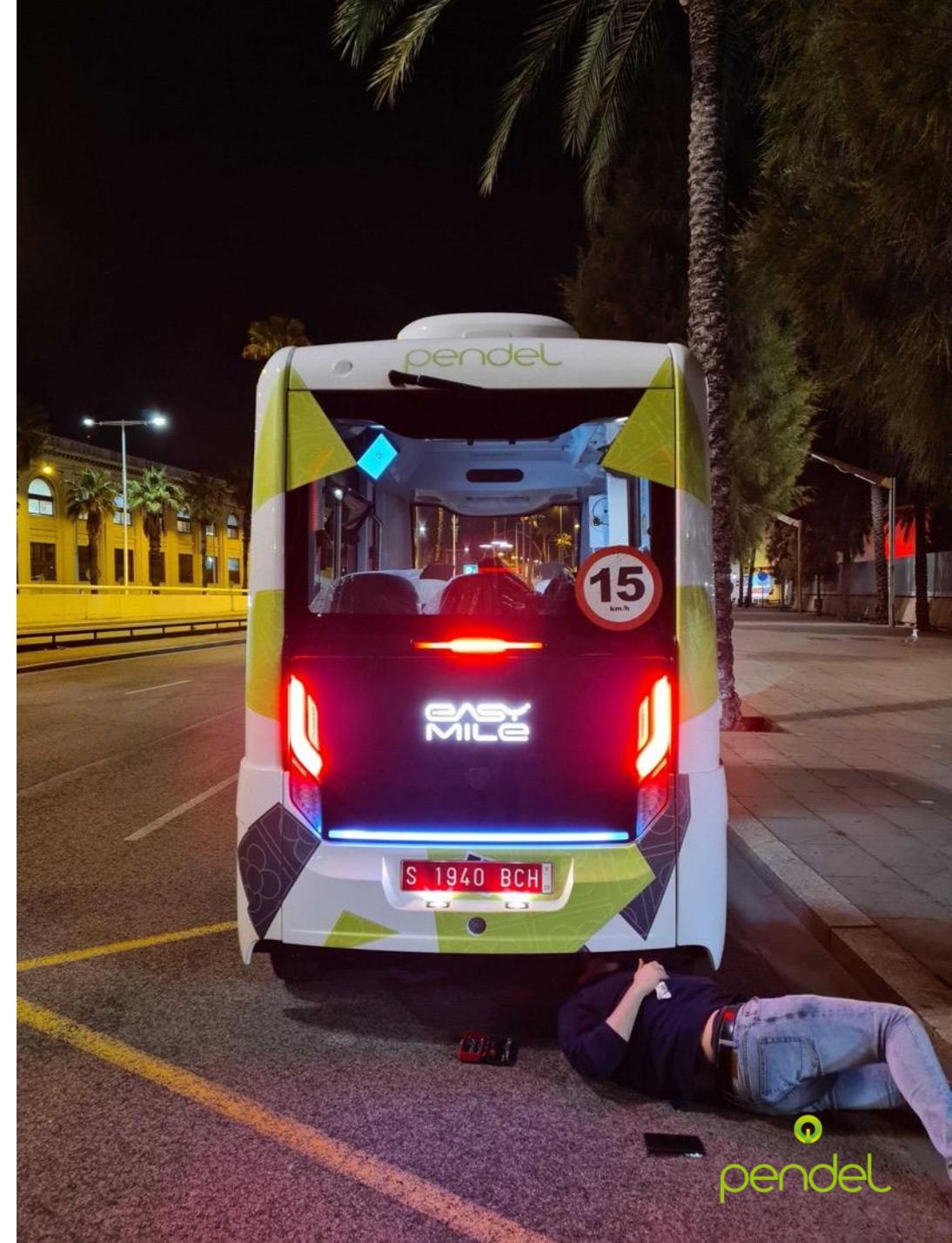
When an emergency stop was needed, the slow change between manual and autonomous modes led to additional hazards.

### Route flexibility is needed

The vehicle should be able to incorporate several routes simultaneously.

### Increase speed of the vehicle

The shuttle took twice as long as a conventional vehicle to complete the route (15km/h).



### 3. Public acceptance should not be underestimated

**Barcelona Secreta** 26 mai · 🌐

El futuro ya está aquí: los coches autónomos llegan a la ciudad 🚗

Voir la traduction



BARCELONASECRETA.COM

**El primer vehículo sin conductores empieza a circular por BCN**  
El 30 de mayo el Puerto de Barcelona estrenará el primer vehículo autónomo y sin conduct...

👍👎👤 698      235 commentaires 211 partages

**Comment 1:** Me da menos miedo un vehículo autónomo que muchos conductores de bus y taxi, ahí lo dejo!  
J'aime Répondre Voir la traduction 15 sem Modifié      👍👎👤 23  
↳ 10 réponses

**Comment 2:** Entendéis porque necesitan reducir población . Todo será máquinas , irás a comprar y adiós cajeras, camareras, todo te lo harás tú o un robot . Ya hay muchos países que tienen robot como camarero . Somos desechos para esta gentuza . Millones de trabajos caerán .  
J'aime Répondre Voir la traduction 15 sem Modifié      👍👎👤 34  
↳ 6 réponses

**Comment 3:** Venga, todo automatizado, sigamos quitando puestos de trabajo, de perlas para los empresarios  
J'aime Répondre Voir la traduction 15 sem      👍👎👤 35  
↳ 5 réponses

**Comment 4:** Agenda 2030. Reducción de la población e inteligencia artificial a tope. Además para que el cacharro este circule antenas 5g en cada esquina ...vamos una maravilla  
J'aime Répondre Voir la traduction 15 sem      👍👎👤 6  
↳ 10 réponses

**Comment 5:** ESE FUTURO DISTOPICO QUE NOS VIENE PISANDO LOS PIES !!  
J'aime Répondre Voir la traduction 15 sem      👍👎👤 2

# Our recommendations

## **Choose your use case and route carefully**

Where can autonomous vehicles be efficient already today and provide a real-added value, moving from demonstrations to transportation services.

## **Anticipate the performance of the vehicle**

At the moment, we see many experiments taking shape as "additional route for experiments", which have a lower consequence on the user journey in case the service is not working properly.

## **Use your pilots to engage with citizens**

Public perception on autonomous vehicles remain controversial. It is crucial to showcase the foreseen benefits (safety, expansion of public transport, driver shortage of AVs...etc.) and engage with different civil stakeholders.



# Main question to keep in mind for transport operators for the next years



## **Where does it make sense to invest and deploy autonomous vehicles ?**

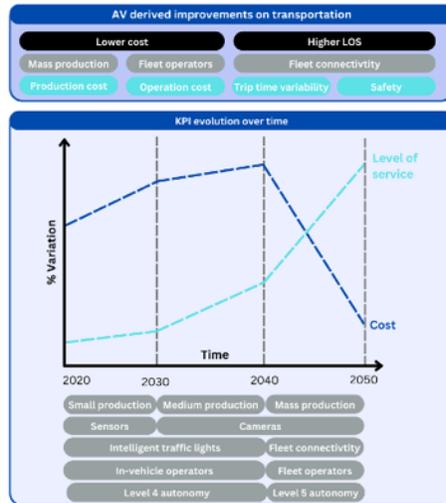
Finding the right balance between the mobility need, the technology performance and its related service cost to define optimal use cases.



## **How to organise multi-service level agreements ?**

Defining the future role of transport operators and the new stakeholders involved in complex public-private collaborations

# This what we are going to do



## Business case analysis

Assessing the costs, benefits and impacts for current and future AV deployment for 3 transport authorities in Europe.



## Multi-deployment and Service Level Agreements

First economically feasible integration of AVs for MaaS public transportation and LaaS urban goods transportation-

Interested to know more ?  
Read our last insight guide or get in touch with us

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