Objectives of the measure

- **At measure level:**
  - Reduce travel times with PT;
  - Reduce PT service disruptions;
  - Increase the commercial speed of bus and tram services;
  - Improve the reliability of bus and tram services;
  - Improve road safety for bikes, cars and PT;
  - Enforce compliance regarding the use of dedicated bus/tram lanes.

- **Contributing to city level objectives of:**
  - Increase the attractiveness of PT systems;

Description of the measure

- **Situation before:**

Bus and trams commercial speed are very low within the city of Lisbon, with commercial speeds frequently in the range of 13-14 km/h within the CARRIS network. This results in increased travel times for passengers, making public transport less attractive and lowering operational efficiency for CARRIS, with impacts on costs, and increased congestion, as a result of an inefficient use of road infrastructure.

Even in areas where buses and tram benefit from priority measures, in particular bus lanes, car drivers frequently disregard the exclusivity of bus lanes, with some using these lanes during congestion periods or blocking them for illegal parking. These instances are a source of disruption for PT services, causing commercial speed reductions, delays and even service suppressions, according to the severity of the infraction. This situation **calls for the implementation of enforcing measures to ensure the compliance** of car drivers **and the proper prioritization of PT vehicles** during peak congestion.

- **General description:**

This measure will develop an advanced analysis of the network and a big data, data analytics and visualization tools to assess the PT network and analyse factors with higher negative impacts on commercial speed. Audit-type assessments shall be performed on the features of bus stops, road structure, bus services and intersections to identify opportunities for improvement. This information shall inform the creation of recommendations for the implementation of PT prioritization measures on the identified bottlenecks, to increase commercial speeds and reduce PT delays.

In addition, this measure shall equip CARRIS buses with cameras to enable the automatic detection of non-compliant vehicles in the bus lanes, and the subsequent deployment of law enforcement mechanisms.

  - **Sub-measures description:**

    - **LIS_02_01:** Enforcing the exclusive use of bus lanes by PT vehicles;

    - **LIS_02_02:** Analysis of PT network enhancement opportunities.

- **Measure outputs:**

This measure will deliver:

- Demonstration of the potential use of camera-based enforcement mechanisms on buses and trams, specifically targeting illegal parking and bus lane use;

- Work with stakeholders to adopt a new regulatory framework, to enable automatic bus lane enforcement and issuing fines on transgressors;
- Analysis and report of significant bottlenecks for bus and trams commercial speed and identification of opportunities for improvement;
- Simulation of some corrective actions and a roadmap on the PT infrastructure adaptations to be implemented in the city.

- **Supporting activities:**

  - Disseminate the effectiveness of automatic bus lane enforcement measures to tackle road congestion and to improve road safety, increasing awareness and acceptability of new regulatory actions;
  - Campaign to disseminate the impacts of illegal parking and irregular use of bus lanes on public transport operations, raising awareness amongst drivers and other road users;
  - Organise meetings with the public transport operators and infrastructure managers, in particular with the City of Lisbon to discuss bottlenecks to commercial speed of PT and measures to address them.

- **Interaction with other city measures: UPPER and non-UPPER measures**

This measure is related to other measures in the city of Lisbon:

- **LIS_10:** To improve the quality and efficiency of the bus service.

Target groups and/or geographical impact areas

- **Target groups:**

  - Car users
  - PT users (current and potential).

- **Geographic impact area:**

  - The main PT corridors in the city, including the main access points to the city and existing multimodal hubs.

Stakeholders

The following stakeholders will be required for the implementation of this measure.

- **Service/Equipment providers:** Provide the cameras to be installed on the buses and trams;
- **CARRIS:** PTO for bus and tram fleet and decision-maker in terms of bus operation. Main end-user in the scope of the project;
- **Municipality:** Decision maker in terms of infrastructure changes to address commercial speed bottlenecks;
- **National Road Safety Authority**: main entity able to authorize changes in the regulatory framework for enforcement of road traffic regulations;
- **EMEL / Local Police**: sharing of information concerning illegal parking areas with impacts on PT commercial speeds for enforcement purposes.
- **Other PT Operators:** Carris Metropolitana can also provide insight on passenger mobility patterns and data to identify bottlenecks and conflict points in the network. They can also receive the report produced in the analysis of the network and benefit from the implemented corrective actions. Possible uptaker of automatic bus lane enforcement systems.

U-tools support

The implementation of this measure will be actively supported by four IT tools from the UPPER toolkit:

- **U-NEED:** This tool will enable the evaluation of typical road traffic flows in the city, and the assessment of congestion hotspots and conflict areas, as well as excessive delays in PT services.
- **U-TWIN:** This tool shall allow the monitoring of the network and the real-time detection of incidents. Such information can be used to validate camera-based detections of incidents, as well as complement the U-NEED estimations regarding the evaluation of bottlenecks.
- **U-SIM.plan:** This tool will allow the evaluation of different strategies of PT prioritization, providing valuable insight about the most promising measures and their potential impacts on the PT services' reliability.
- **U-SIM.live:** This tool shall enable the real-time assessment of the network and the detection of incidents in real-time, as well as the prediction of demand and traffic conditions. The testing of potential corrective measures can help decision-makers assess which PT prioritization strategies to deploy in the moment.

Link to other UPPER measures

This measure is similar to UPPER measures implemented in other cities, especially:

- **VAL_04:** To reduce travel times through the implementation of dedicated bus lanes;
- **ROM_04:** To design the new high frequency and high-capacity PT infrastructure**;**
- **ROM_07:** Use of advanced technology to increase the efficiency and reliability of PT;
- **BUD_06:** To improve the existing PT prioritizing tools in Budapest**;**
- **LEU_07:** Increase the quality of the PT services through traffic management and dedicated lanes for PT**;**
- **TES_06:** Social optimum-based traffic management to reduce PT travel times and increase user satisfaction.

Process of implementation of the measure

Stages	Description	Intermediate milestones
Design	Data collection, geospatial analysis of traffic flows and identification of conflict areas.	- Data collection of non-compliance instances in bus lanes; - Data collection of private vehicle and PT traffic; - Data collection of PT operation speeds; - Data analytics; - Identification of main network bottlenecks and conflict areas.
Preparation	Purchase and instalment of cameras on buses and trams. Review of regulatory framework regarding fines. Selection of main corridors or intersections to implement PT prioritization. Awareness raising campaigns.	- Procurement of technologies for camera-based enforcement of bus lanes; - Instalment on fleet; - Regulatory redesign to allow fining and identification of enforcing entities; - Identification of feasible PT prioritization strategies; - Simulation of PT prioritization strategies and selection of the most suitable ones; - Awareness raising campaigns regarding the impacts of illegal parking and use of bus lanes on the operation of public transport.

Implementation	Implementation of bus lane enforcement. Implementation of PT prioritization strategies.	- Implementation of bus lane enforcement; - Monitoring of bus lane enforcement impacts; - Implementation of PT prioritization strategies; - Monitoring of PT prioritization strategies; - Sharing of information and experience with other cities and operators.

Sub-measures and preliminary indicators

Measure	Sub-measures	Impact indicators
LIS_02	**LIS_02_01:** Restrict cars on bus lanes	- Number of PT vehicles equipped with enforcement systems; - Number of incidents; - Number of accidents; - Number of detected infractions; - Number of fines issued; - Commercial speed.
LIS_02	**LIS_02_02:** Implement PT priority on key corridors	- Commercial speed; - PT delays/ punctuality index; - PT reliability (measured in percentage of realized services *versus* planned services).