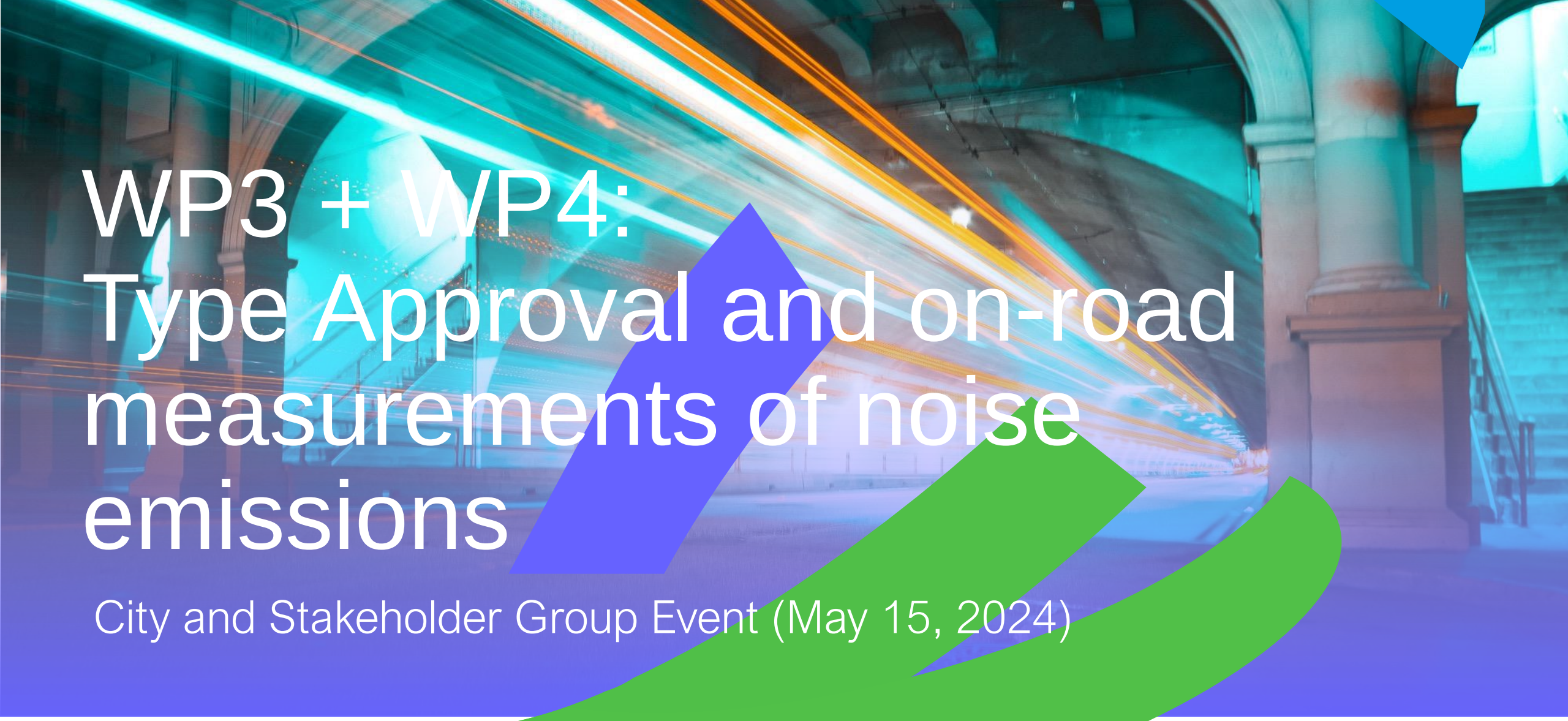


WP3 + WP4: Type Approval and on-road measurements of noise emissions

City and Stakeholder Group Event (May 15, 2024)

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101056777

L-vehicles Emissions and Noise mitigation Solutions

AGENDA

1. WP3 + WP4 CONTENTS & OBJECTIVES
2. L-CATEGORY VEHICLES TESTING
3. TYPE APPROVAL TESTING
4. ON-ROAD MEASUREMENT EQUIPMENT
5. POSTPROCESSING

WP3 + WP4 CONTENTS

Overview

WT 3.1

Devices for noise emissions tests

- Development & validation
- Technical requirements for on-board, on-road noise data collection
- Develop and implement 10 noise data loggers for on-board, on-road measurements

WT 3.3

Noise emission testing (on-road)

- Execution of on-road tests
- Data acquisition, processing, and evaluation
- Correlation and validation investigations
- Derive Real-World (RW) Driving Cycle

WT 4.2

Noise emission testing (test track)

- Type Approval (TA) tests
- Testing procedures according to Type approval tests
- Execution of testing on test track
- Conduction of RW tests

WP3 + WP4 CONTENTS

Objectives

Measurements on test track

On-road measurements

- Objectives
  - Develop and validate systems capable for on-road measurements of noise of LVs
  - On-road noise emissions characterization
  - Assessment of RW operation events that can produce high annoyance and effects on health
  - Definition of RDE test procedure for on-road LVs noise emissions verification
  - Characterize on-track noise performance in TA and RW type of riding conditions
  - Compare on-road and regulatory noise emissions results and provide final recommendations

L-CATEGORY VEHICLES TESTING

Test matrix

Category	LV sub-category
L1e	L1eB - Two-wheel moped
L2e	3-wheel moped
L3e & L4e	L3e-A1 Low-performance
	L3e-A2 Medium-performance
	L3e-A3 High-performance
	L3e-AxE Enduro
L5e Tricycle	
L6e	L6e-A Light on-road quad
	L6e-B Light quadri-mobile
L7e	L7e-B1 All terrain quad
	L7e-B2 Side By Side Buggy

- Number of vehicles for noise emissions measurements

Total	**150**
# of vehicles for Real-World (RW)	90
# RW & TA	22
# of vehicles for Type Approval (TA)	38

A total of 150 vehicles will be measured.

112 vehicles in Real-World

60 vehicles will be measured acc. to TA.

- Vehicles to reflect national fleet mix to the degree possible

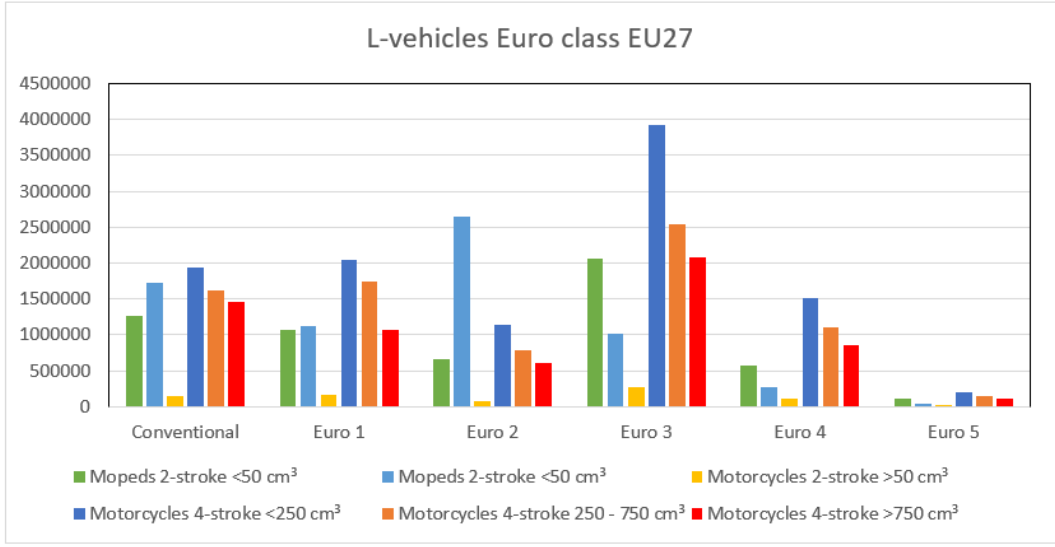


Figure 2.4: Figure 4: Euro class of L-vehicles in the EU27 fleet

LENS L-vehicles Emissions and Noise mitigation Solutions

TYPE APPROVAL TESTING

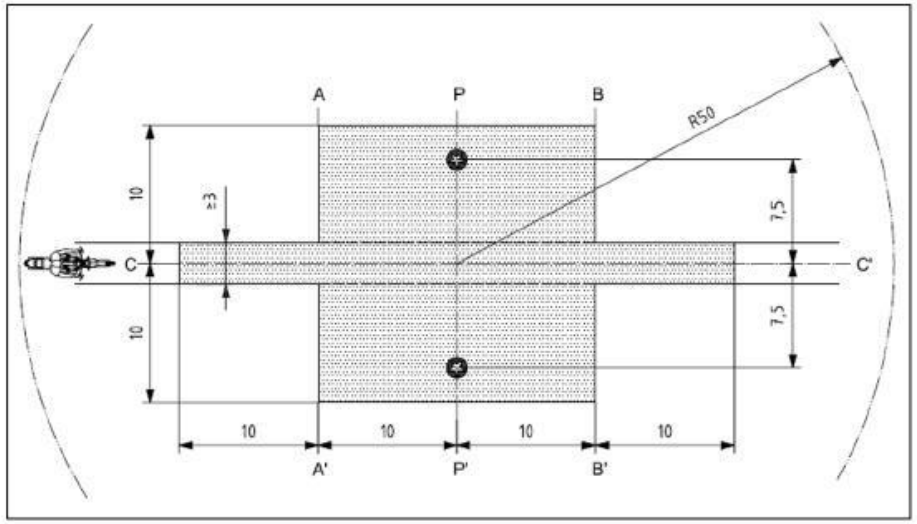
Regualtions

- **UN Regulation 41** (rev2, 05 series of amendments) → L3 category vehicles
- **UN Regulation 63** → L1, L6e-A category vehicles
- **UN Regulation 9** → L2, L5, L6e-B, L7 category vehicles

TYPE APPROVAL TESTING

Measurement procedure (Regulation 41)

- Setup:
  - Distance Microphone to line CC‘: 7.5 m
  - Distance A to B: 20 m
- Equipment:
  - Meteorological instrumentation (e.g. Temperature, wind speed..)
  - One or two microphones
  - Instrumentation for rotational speed
  - Instrumentation for speed measurement
- Covered test procedures:
  - Stationary test
  - Acceleration pass-by test
  - Constant speed pass-by test
  - ASEP
  - ➢ Focus on RD-ASEP (05 series of amendment)



Key

	Minimum area covered with test road surface, i.e. test area
	Microphone positions (height 1,2m)

TYPE APPROVAL TESTING

Test Track Layout

IDIADA

ISO I and ISO II test area dimensions	20 x 20 m
Length of acceleration lane	300 m

IKA

© ika

Acoustic road surface (DIN ISO 10844/94)
width 20 m; length 45 m

TYPE APPROVAL TESTING

Test track

- Type Approval measurements on test track
  - Pass by noise measurements

IDIADA

IDIADA

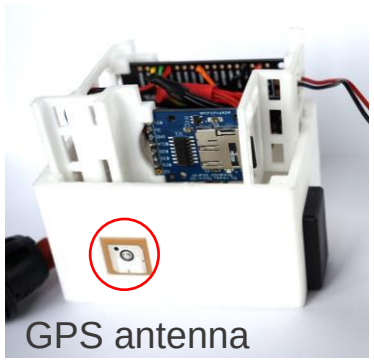
ON-ROAD MEASUREMENT EQUIPMENT

Noise Data loggers

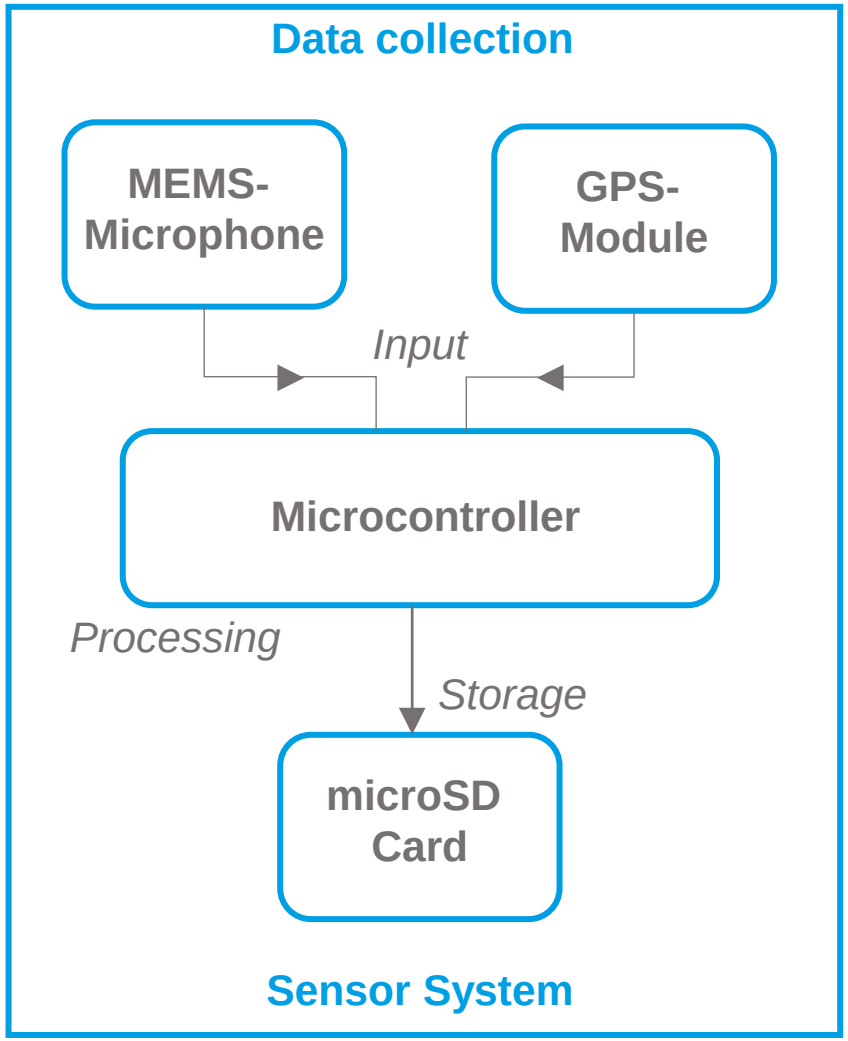
Sensor system for noise and GPS data logging

- Components:
  - Microcontroller (Control Unit)
  - MEMS Microphone
  - GPS Module
  - LED (User feedback)
  - Battery


microphone opening


GPS antenna


Sensor system with bracket

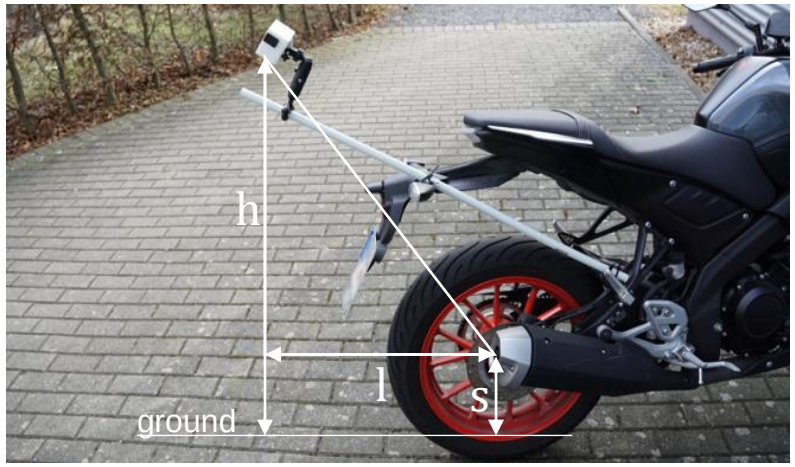


LENS L-vehicles Emissions and Noise mitigation Solutions

ON-ROAD MEASUREMENT EQUIPMENT
WT 3.3

Conduction of measurements

- System will be mounted in the rear middle of the vehicle
- Microphone: Aligned to the back
- GPS antenna: Aligned to the sky

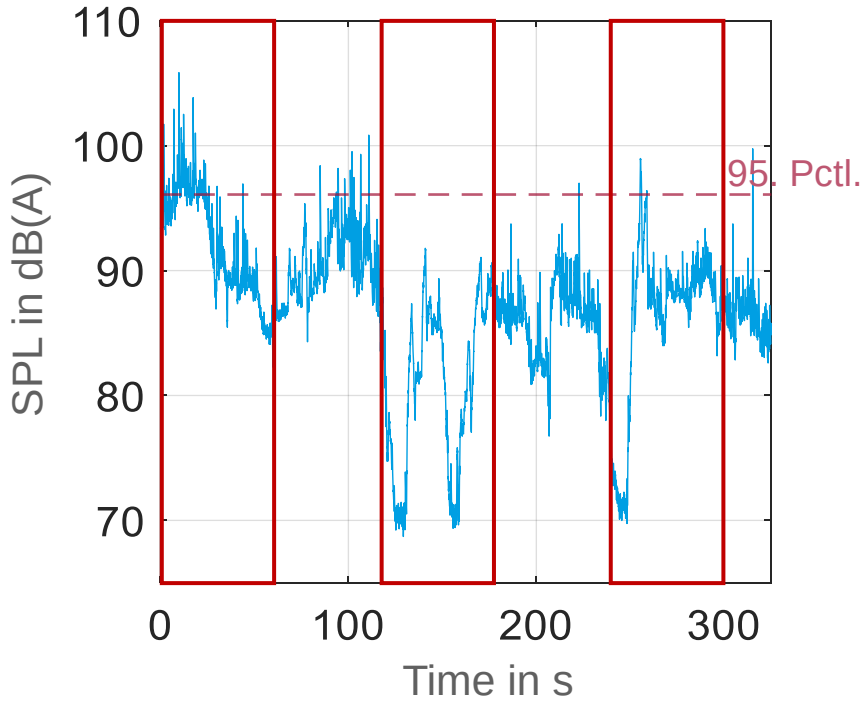


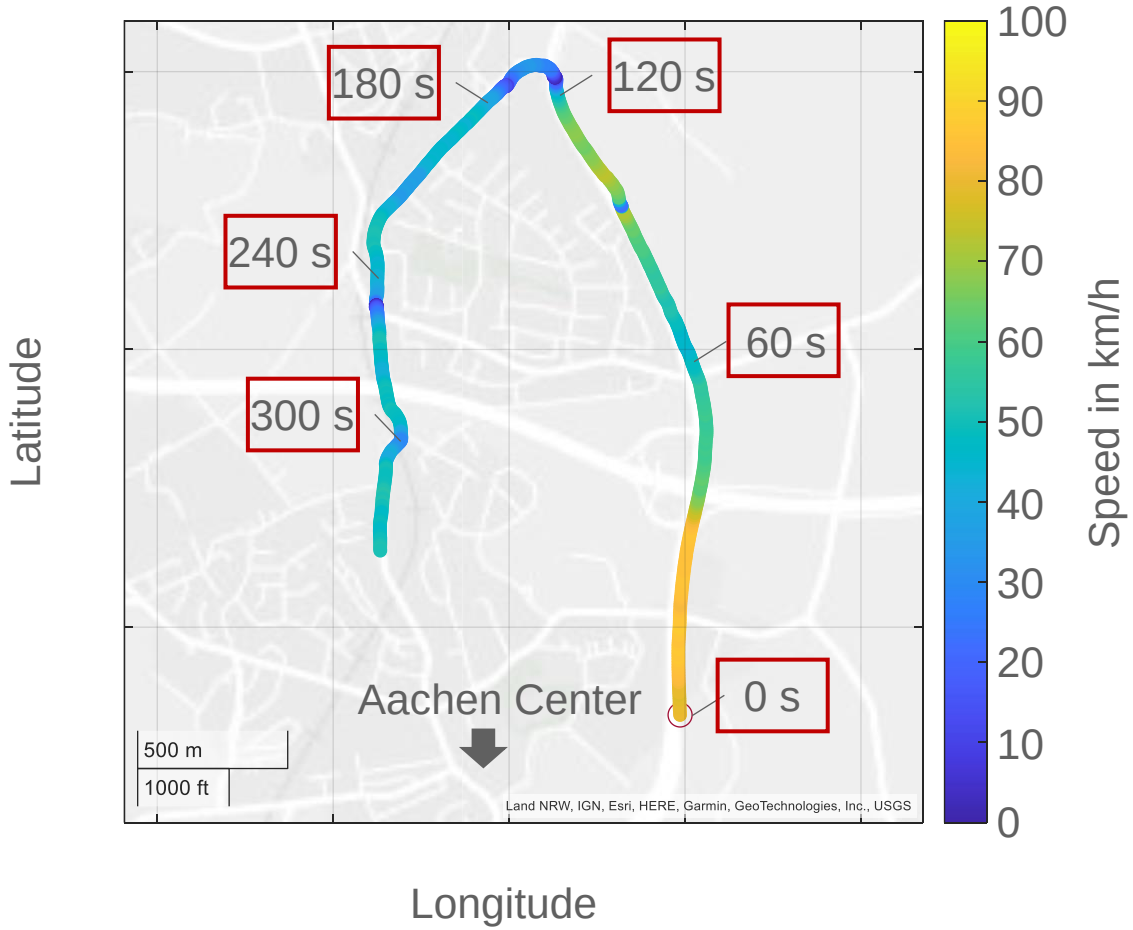
POSTPROCESSING

On-road measurements

Development of real-world driving cycle

- Identification of critical driving scenarios





LENS L-vehicles Emissions and Noise mitigation Solutions

FURTHER STEPS

- Develop Real-World Driving Cycle
- Comparison with Type Approval tests
- Derivation of recommendations for current Type Approval procedures

Thank you!