

# **Informal Working Group on Real-Driving Additional Sound Emission Provisions / Quiet Road Transport Vehicle**

## **Life Assessment 01/02 – Briefing**

Aachen, June 4<sup>th</sup> 2024

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Institute for Automotive Engineering (ika)

# Agenda

- General information
- Setup & safety instructions
- Additional background noise
- Vehicles being tested
- Procedure & subjective assessment

In this event different vehicles in the same driving conditions are presented in order to ...

- Provide a perception of different vehicles in the context of background noise.
- Convey an impression of safety aspects based on the vehicle sound emission.

Therefore, vehicles with various technologies (e.g. ICE, BEV) and categories will be shown in typical driving scenarios, representative for location where vehicles will interact with vulnerable road users (pedestrians)

The results of objective and subjective assessment will be captured, shown and discussed after the life session

# General information

## Schedule

You find your group number on your badge

Time	Group #1		Group #2	
	Location	Subject	Location	Subject
25 min	Meeting room	Briefing	Meeting room	Briefing
15 min	Transfer to test track		Meeting room	Discussion on expectations, Q&A
50 min	Testtrack	<b>Life assessment</b>		
10 min	Transfer to meeting room		Testtrack	<b>Life assessment</b>
50 min	Meeting room	Discussion on impressions, Q&A		
30 min	Meeting room	Presentation of results to both groups and discussion	See #1	See #1



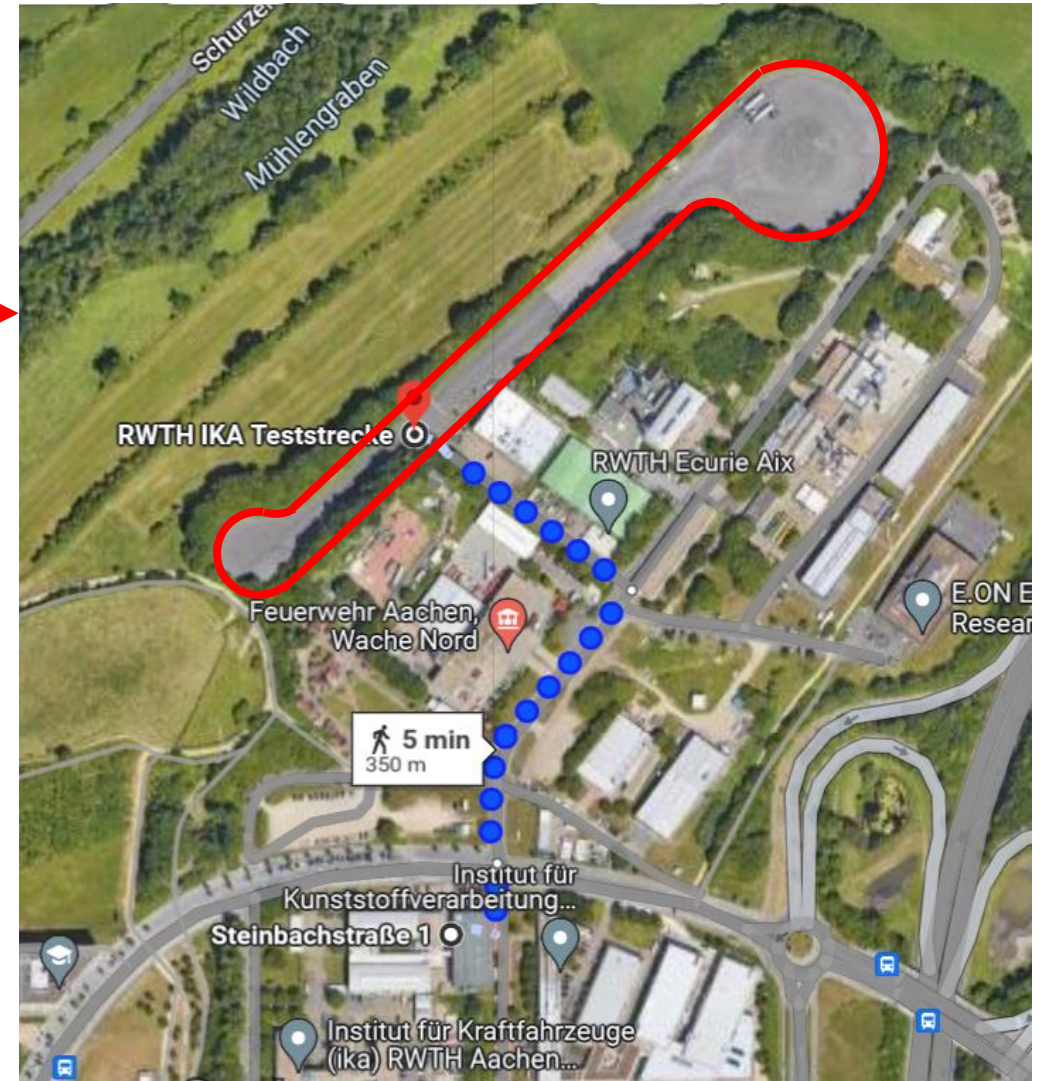
Group 1 = CPs, Non-industry stakeholder, few OICA members

Group 2 = OICA members

# General information

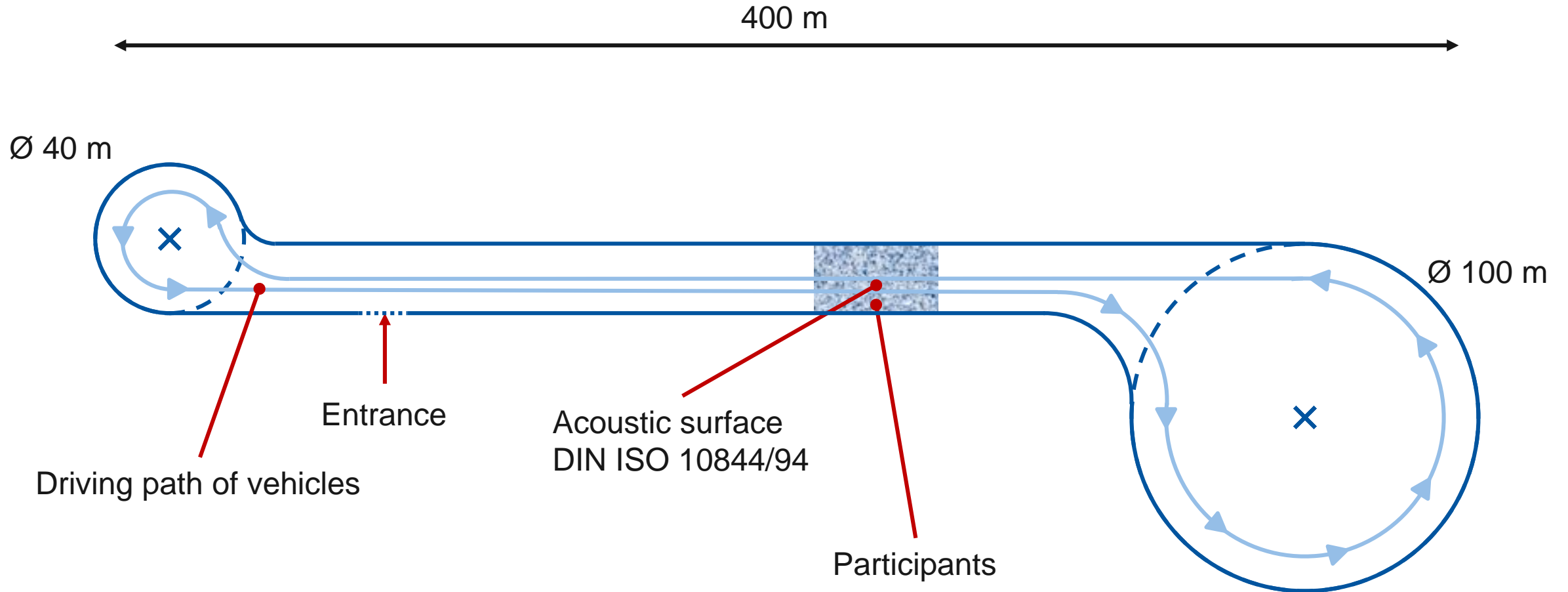
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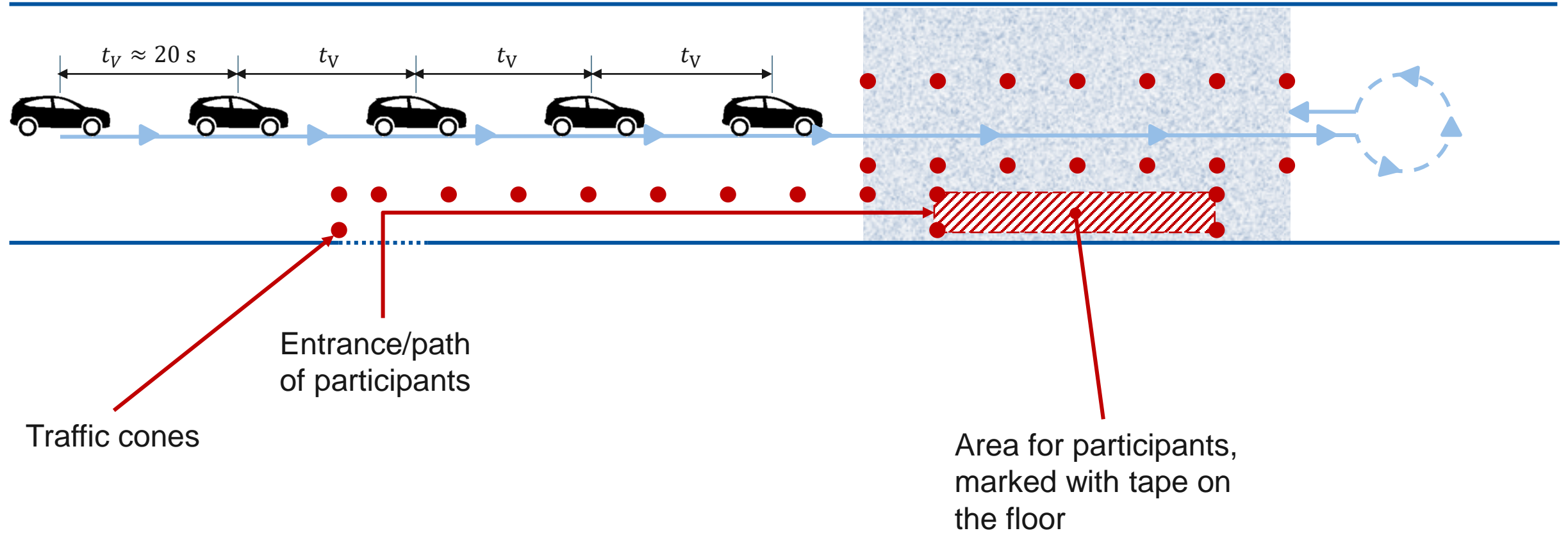
# Procedure & safety instructions

## Test track geometry and locations



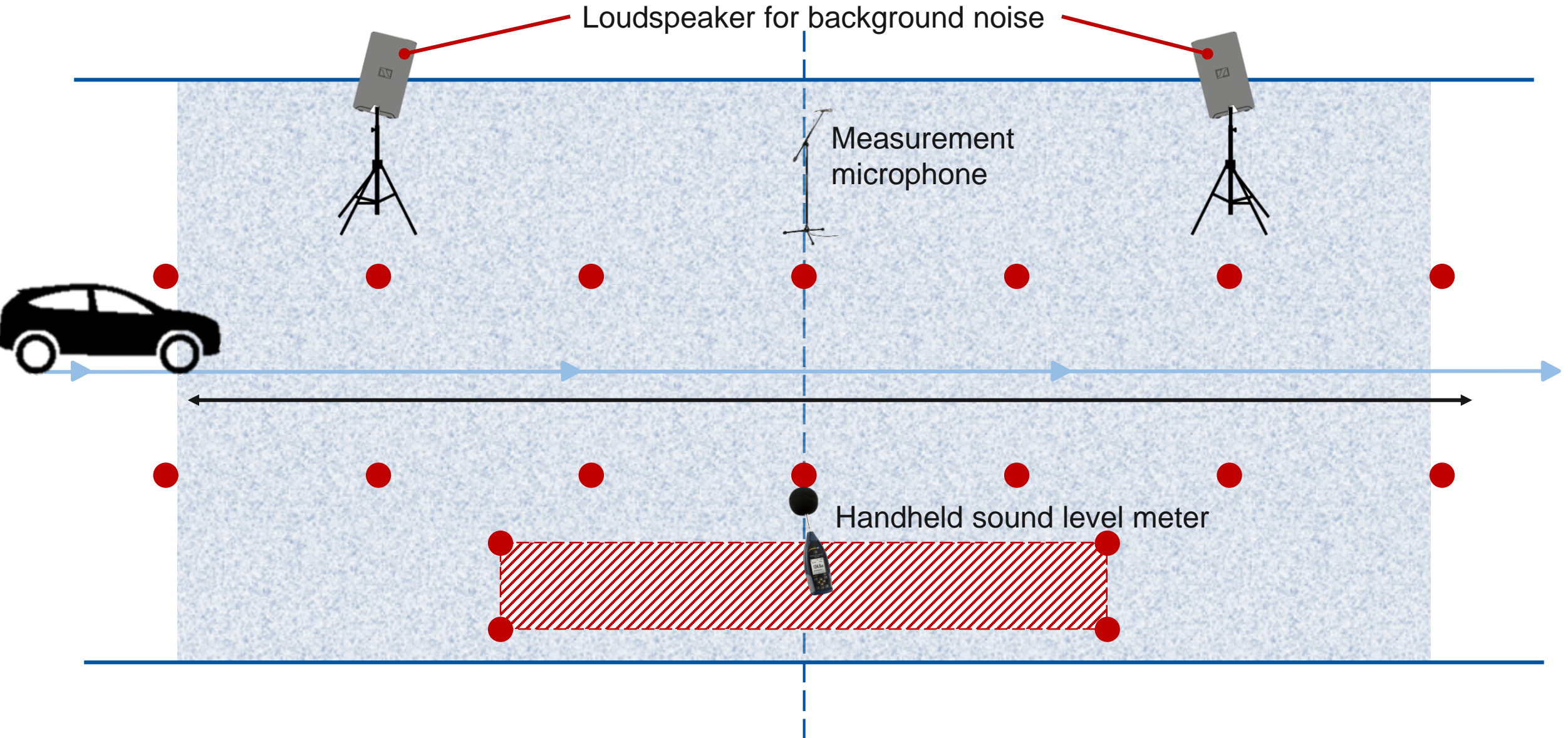
# Procedure & safety instructions

## Procedure



# Procedure & safety instructions

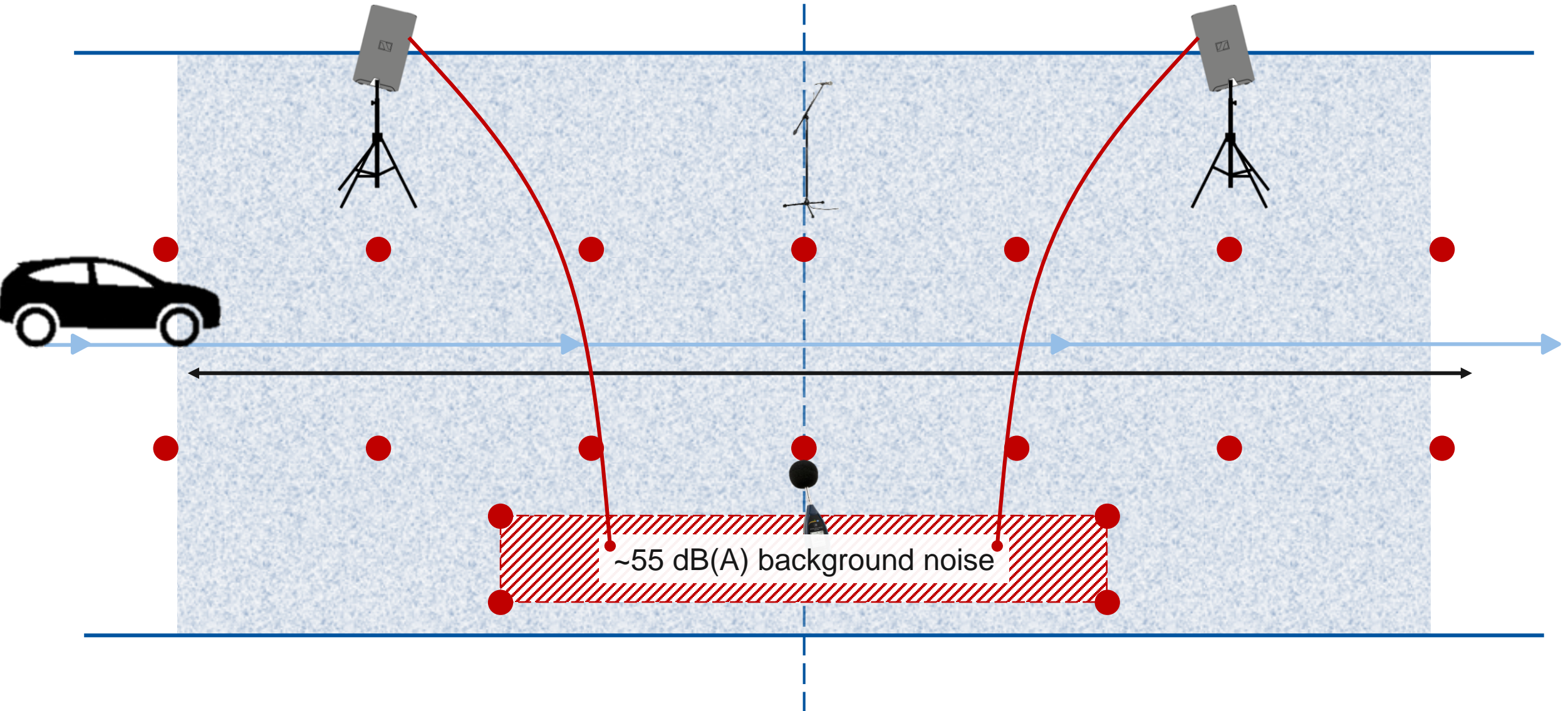
## Measurement setup





# Procedure & safety instructions

## Measurement setup



# Additional background noise

## Overview & selection



White paper on external warning sounds for electric cars  
- Recommendations and guidelines

Financed by Danish Sound Technology Network

AV 1224/10  
Project no.: A520040  
Page 1 of 65 incl.  
11 appendices

28 March 2011

**Contributors:**

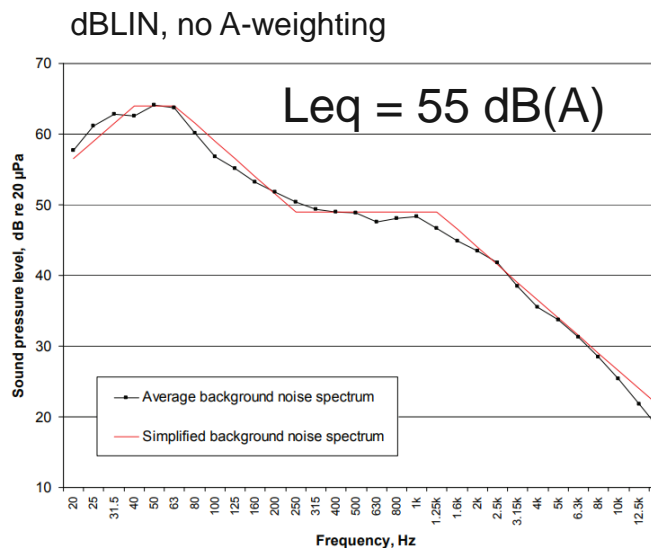
DELTA SenseLab [madebydelta.com/senselab](http://madebydelta.com/senselab) Torben Holm Pedersen

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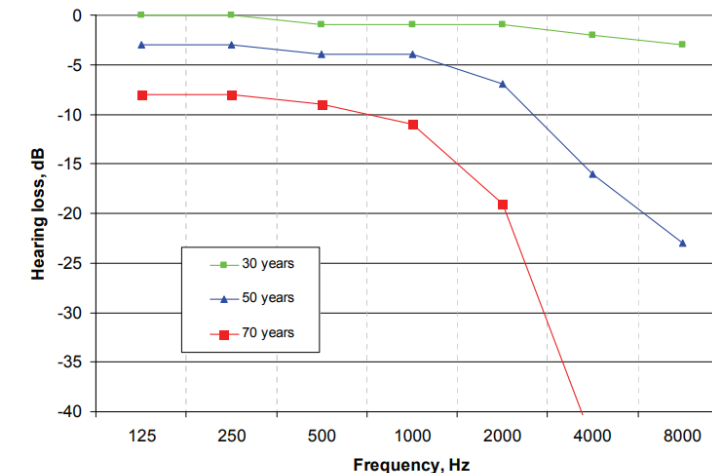
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**Figure 6**  
Average and simplified background noise spectra. The average spectrum is the average of the topmost 4 spectra of Figure 4.



**Figure 2**  
Average hearing thresholds for different age groups (males) according to ISO 7029.

For the development of the minimum sound specification, the **GTR working group** decided to use the 2011 publication of **Pedersen model on a reference background noise**

All international Regulation, laws and standards are based on that background noise model

➔ **For the life Assessment, various situation** (sound samples) have been taken and **adjusted to 55 dB(A)** average sound level



# Additional background noise

## Overview & selection

Scene #1 - Café



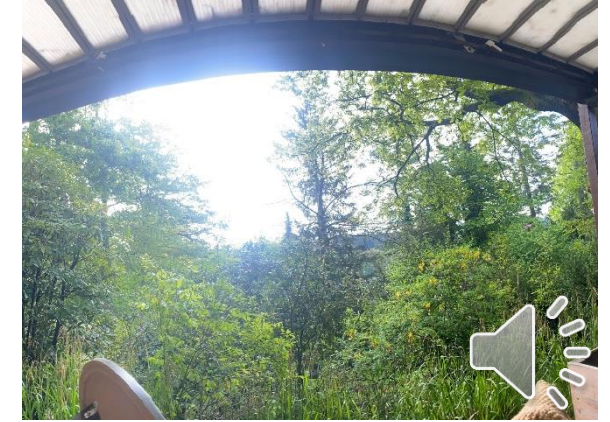
Scene #3 – Traffic lights



Scene #5 – 30 km/h road



Scene #7 – Forest



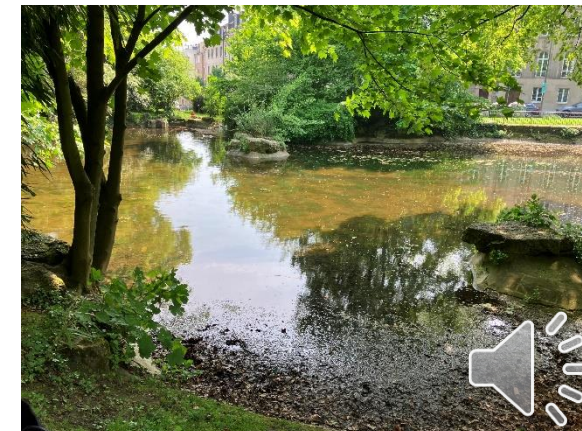
Scene #2 – Shopping street



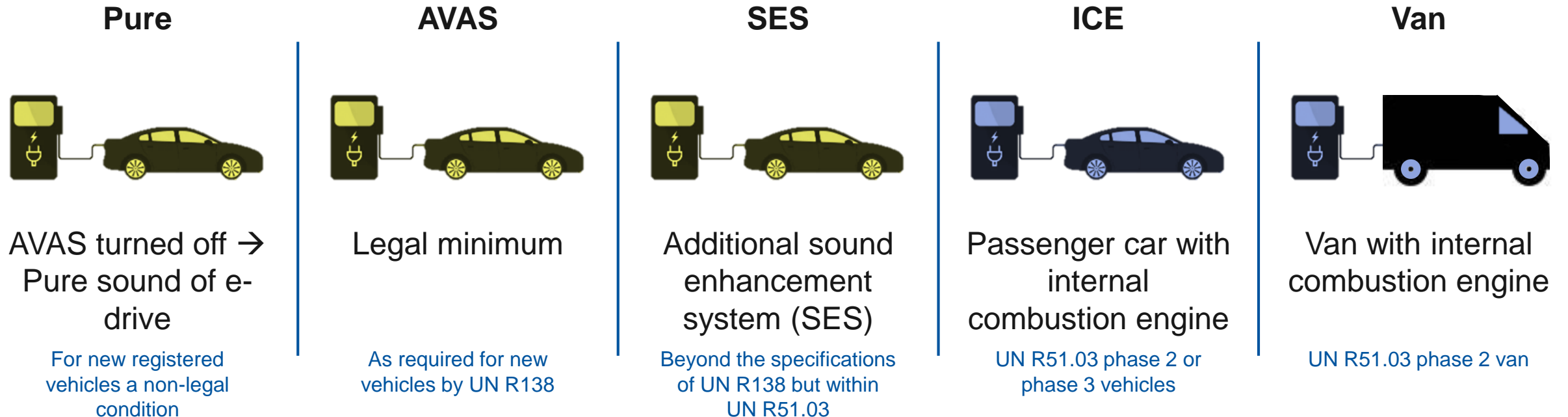
Scene #4 - Fountain



Scene #6 – City pond



- **Many vehicles were made available** for the event, from compact cars to vans and trucks, from ICEs to BEVs
  - 2 x Porsche
  - 2 x Audi
  - 2 x VW
  - 2 x Renault
  - 3 x Hyundai
  - 1 x BMW
  - 1 x MAN
- Due to the limited time, **the focus is on 5 vehicles**
- Subsequently, further vehicles and conditions can be shown as required





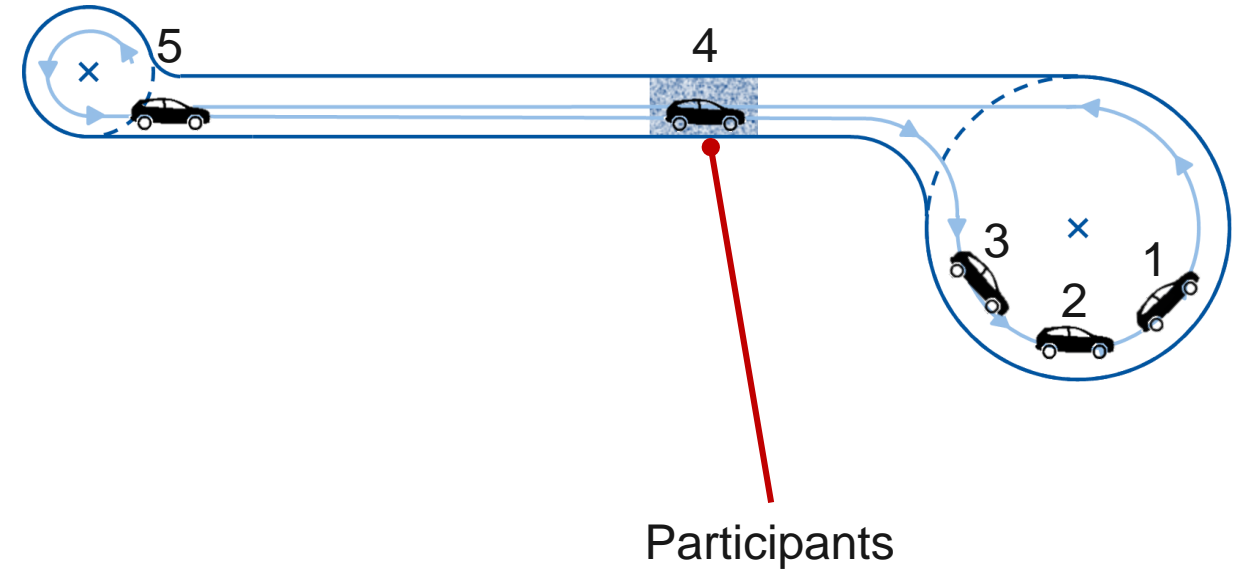
# Demonstrated driving maneuvers

## Overview

Block
1 – Subjective assessment of safety & noise
2 – Further relevant driving conditions
3 – Flex block depending on vehicle availability & interest

In block 1 & 2 for every driving condition:

1. Multiple test vehicles gathered at left turning circle
2. Vehicles passing from left to right with small distances between them (~20 s)
3. Vehicles gathered at right turning circle
4. Vehicles passing from right to left with small distances between them (~20 s)



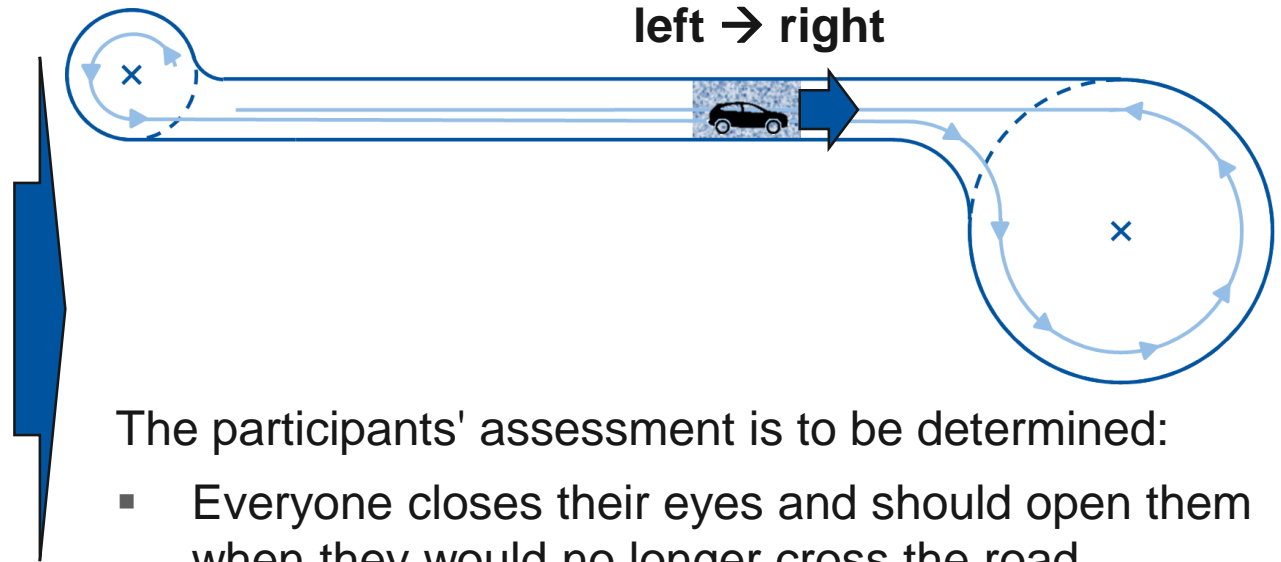
# Demonstrated driving maneuvers

## Block 1/3 – Subjective assessment on safety

Driving scenarios:

Vehicle	Speed [km/h]	Accel [m/s <sup>2</sup> ]
#1 - #5	[20]	0
#1 - #5	0	[3]

- Vehicles #1 - #5 **without** specification given
- Order can vary



The participants' assessment is to be determined:

- Everyone closes their eyes and should open them when they would no longer cross the road
- Online life assessment (explained in detail later):

**How do you feel in crossing the road?**

**Safe** ○ — ○ — ○ — ○ — ○ **unsafe**

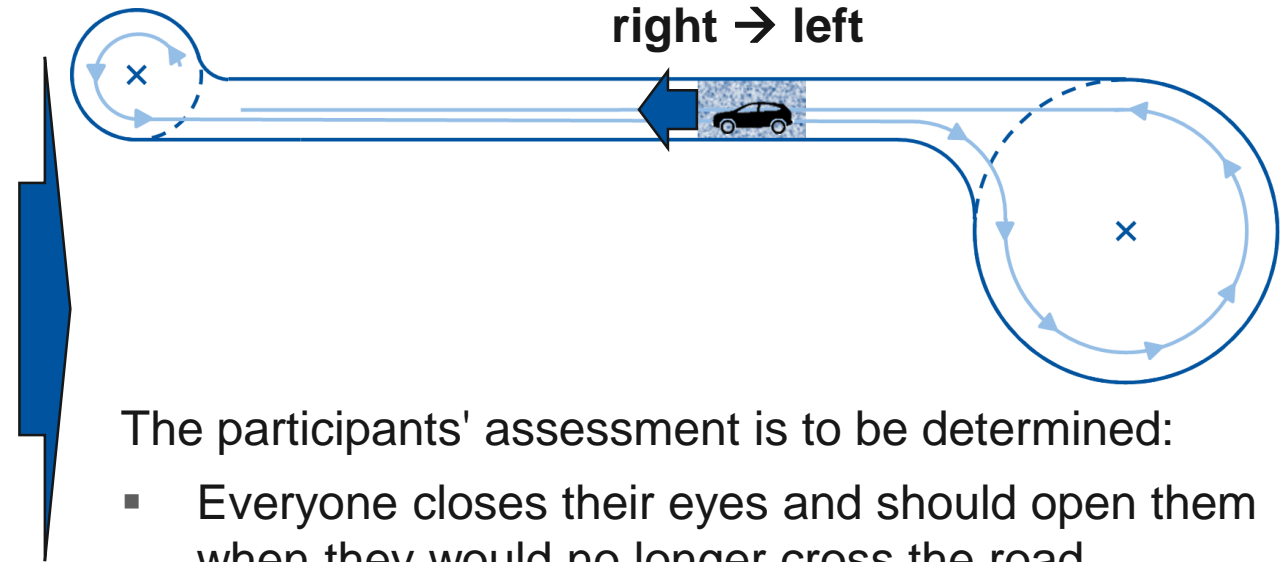
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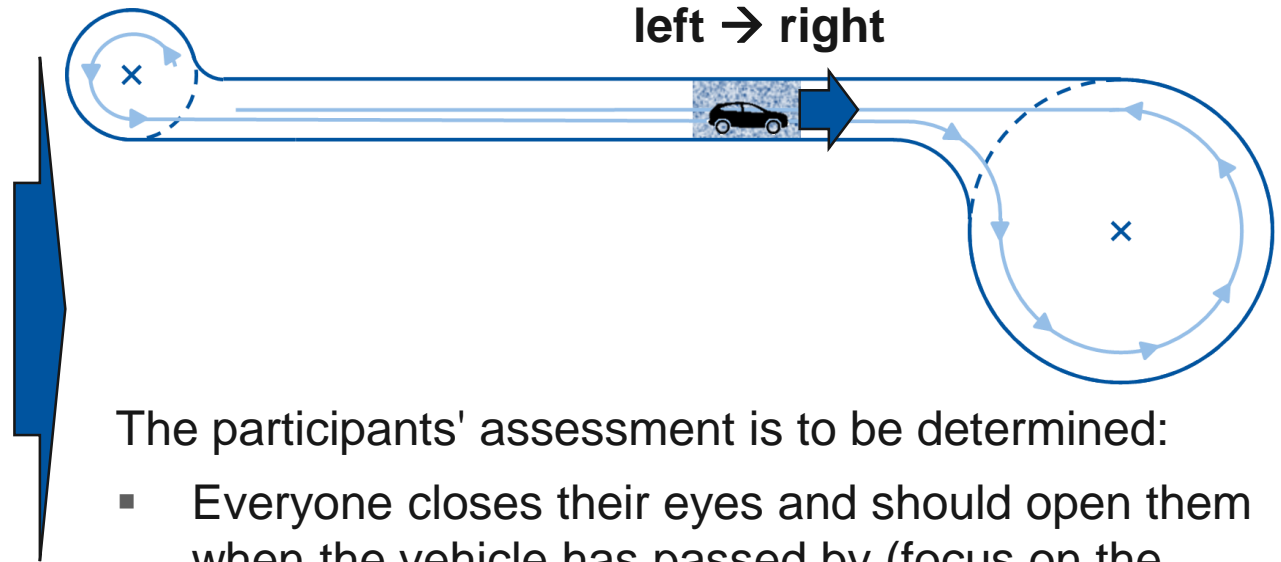
# Demonstrated driving maneuvers

## Block 1/3 – Subjective assessment on sound emission

Driving scenarios:

Vehicle	Speed [km/h]	Accel [m/s <sup>2</sup> ]
#1 - #5	[20]	0
#1 - #5	0	[3]

- Vehicles #1 - #5 **without** specification given
- Order can vary



The participants' assessment is to be determined:

- Everyone closes their eyes and should open them when the vehicle has passed by (focus on the sound emission)
- Online life assessment (explained in detail later):

**How do you rate the sound emission?**

low ○ — ○ — ○ — ○ — ○ high



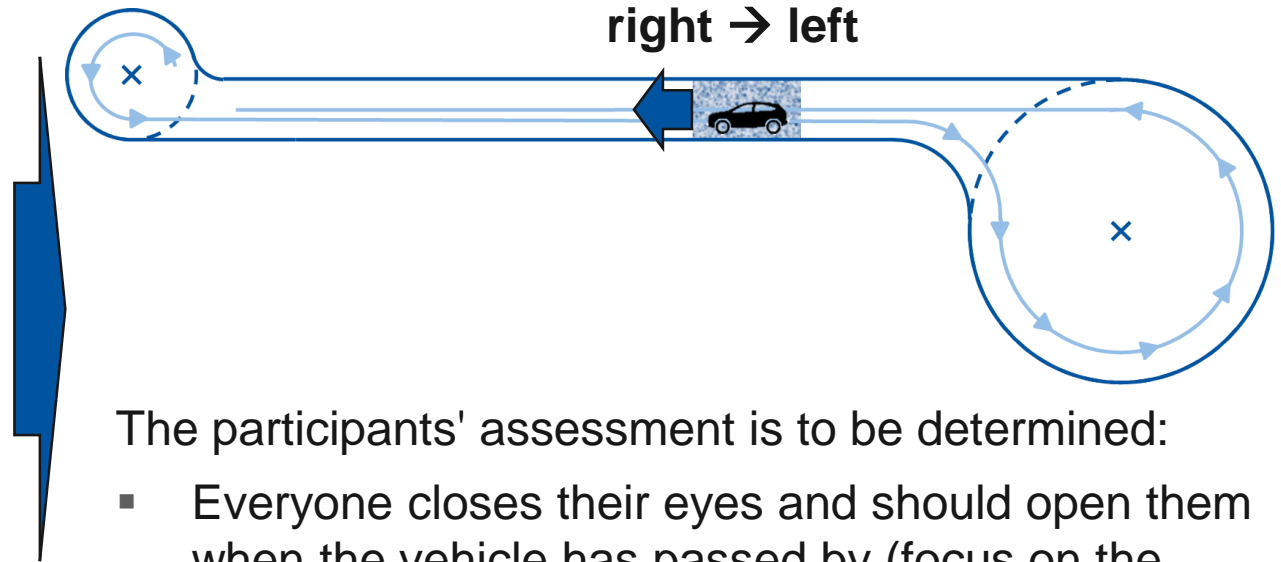
# Demonstrated driving maneuvers

## Block 1/3 – Subjective assessment on sound emission

Driving scenarios:

Vehicle	Speed [km/h]	Accel [m/s <sup>2</sup> ]
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The participants' assessment is to be determined:

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- Online life assessment (explained in detail later):

**How do you rate the sound emission?**

low ○ — ○ — ○ — ○ — ○ high

# Demonstrated driving maneuvers

## Block 2/3 – Further driving conditions

Driving scenarios:

Vehicle	Speed [km/h]	Accel [m/s <sup>2</sup> ]
#1 - #5	[40]	0
#1 - #5	20	[3]

In order to enhance the experience of the event, further driving conditions should be carried out after the subjective survey, but now with knowledge of the vehicle specification

- Vehicles #1 - #5 specification **can be given**
- Order can vary



# Demonstrated driving maneuvers

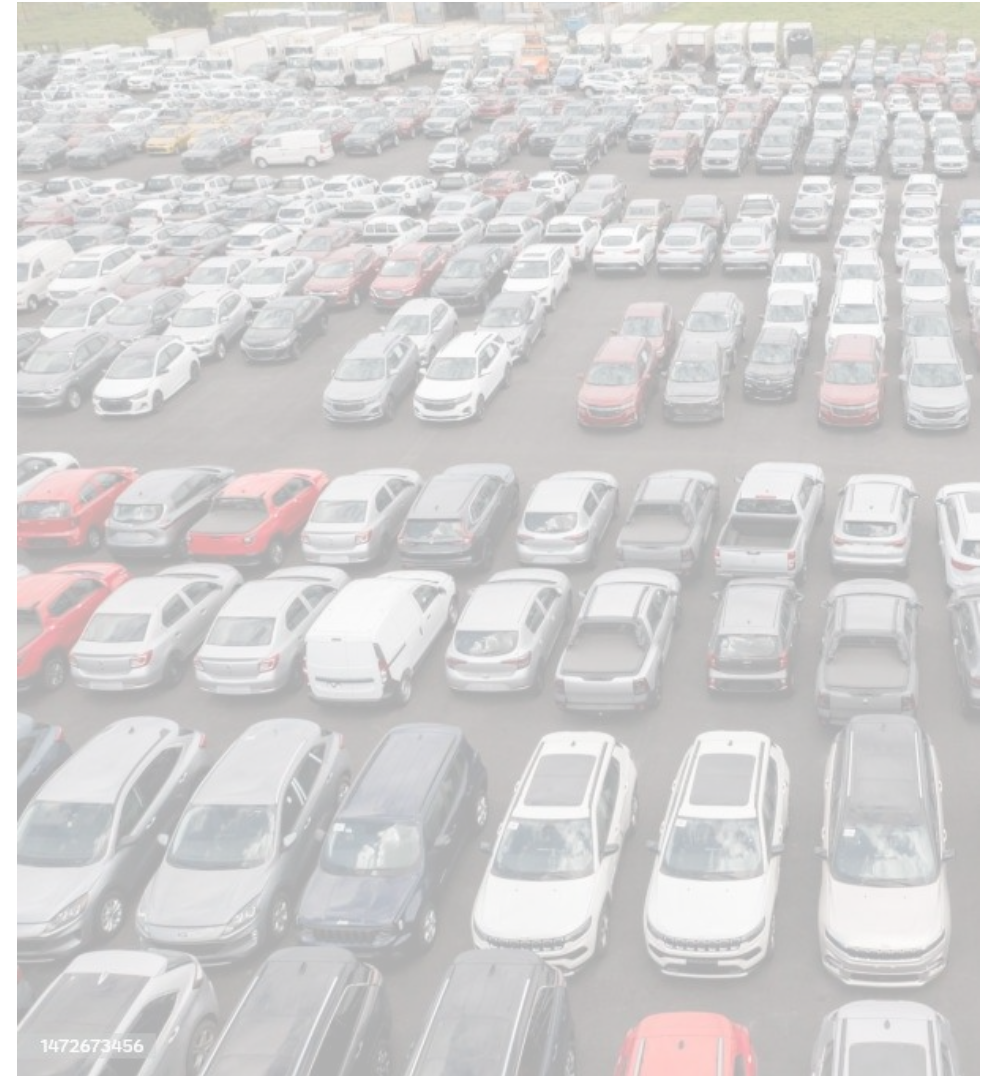
## Block 3/3 – Flex block

In this block, the participants can request additional rides:

- Different vehicles
- Different driving conditions
- Different background noises



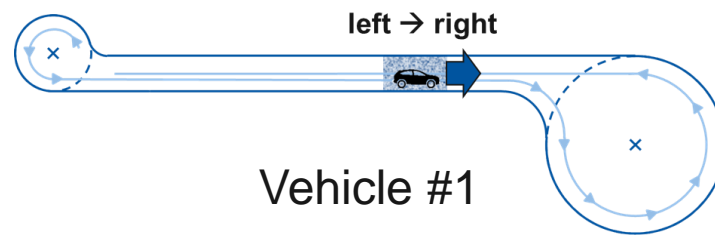
**Background noise**



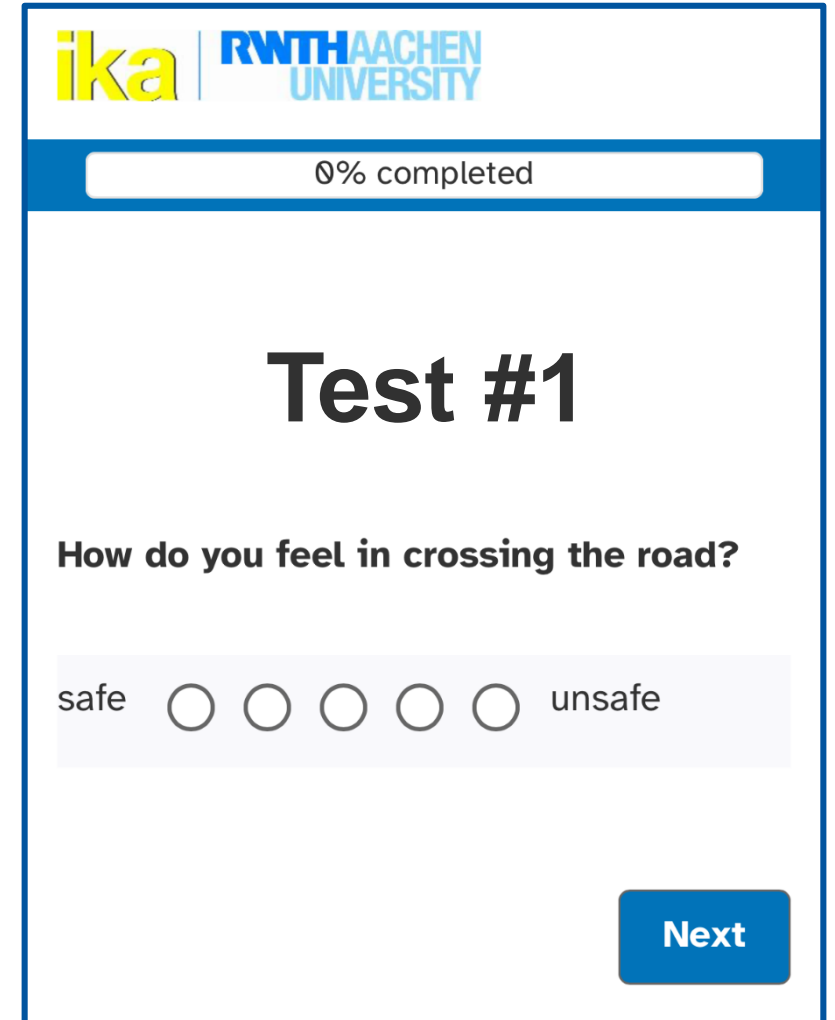
# Capturing the subjective impressions

## Not a study but an experience

QR-Code for Questions  
on test track



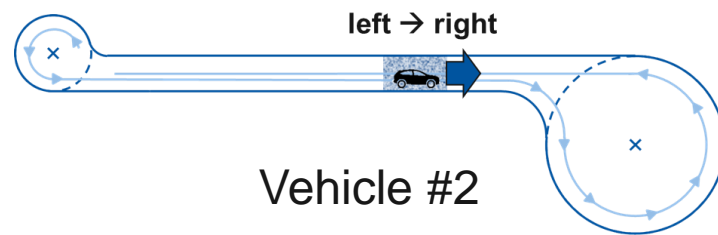
Webbrowser on mobile phones



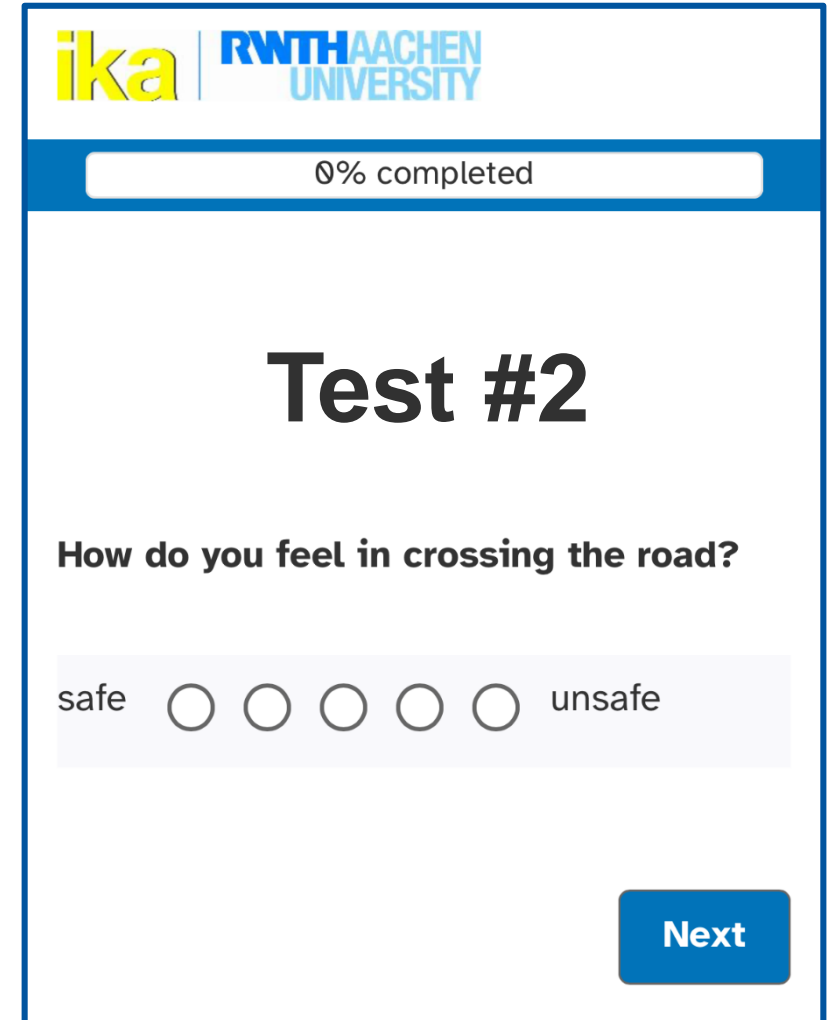
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Webbrowser on mobile phones

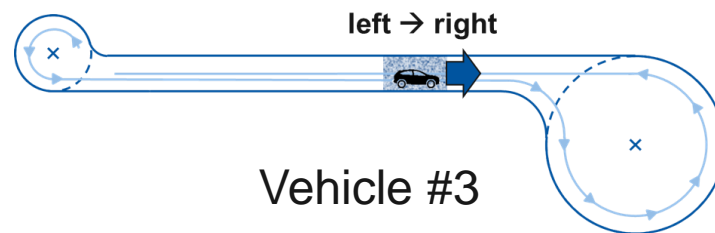




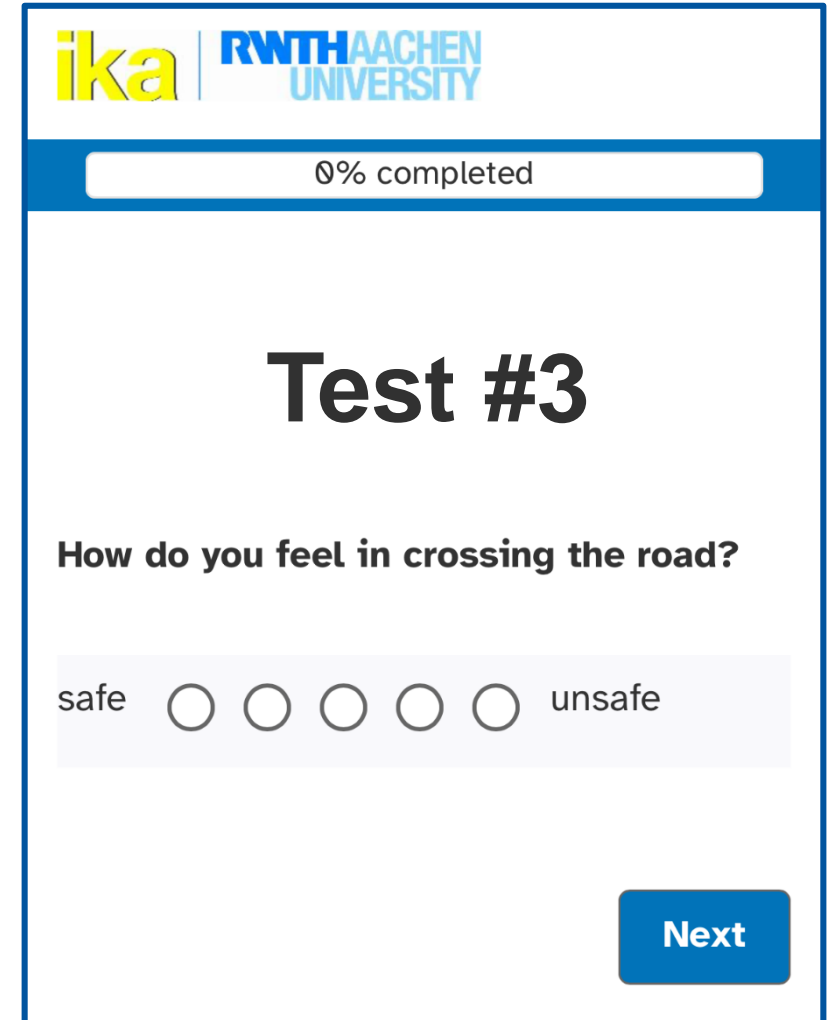
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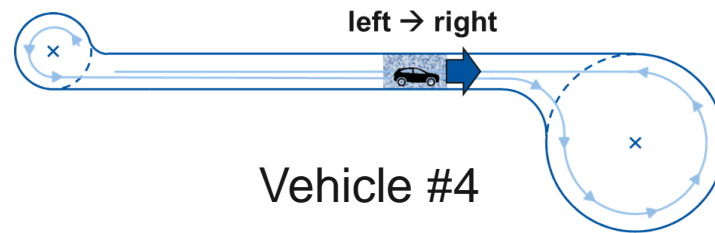
Webbrowser on mobile phones



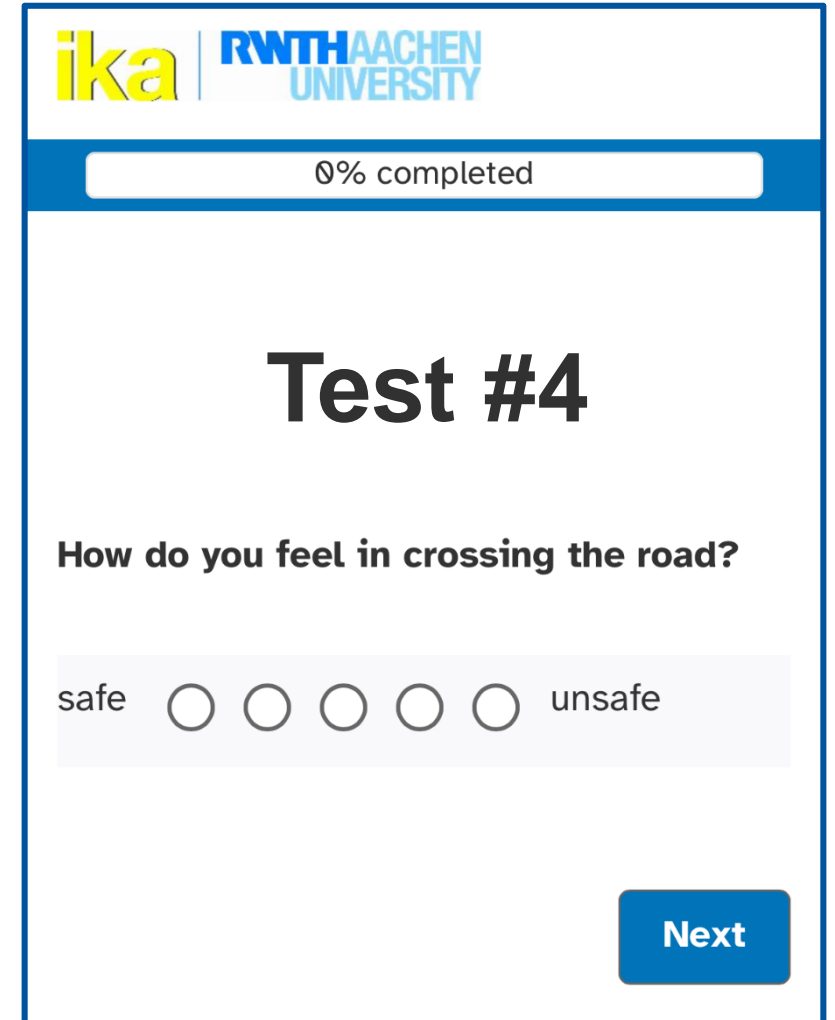
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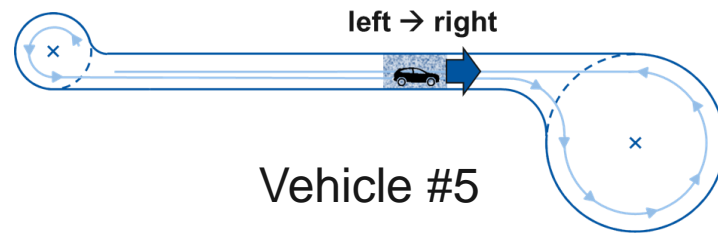
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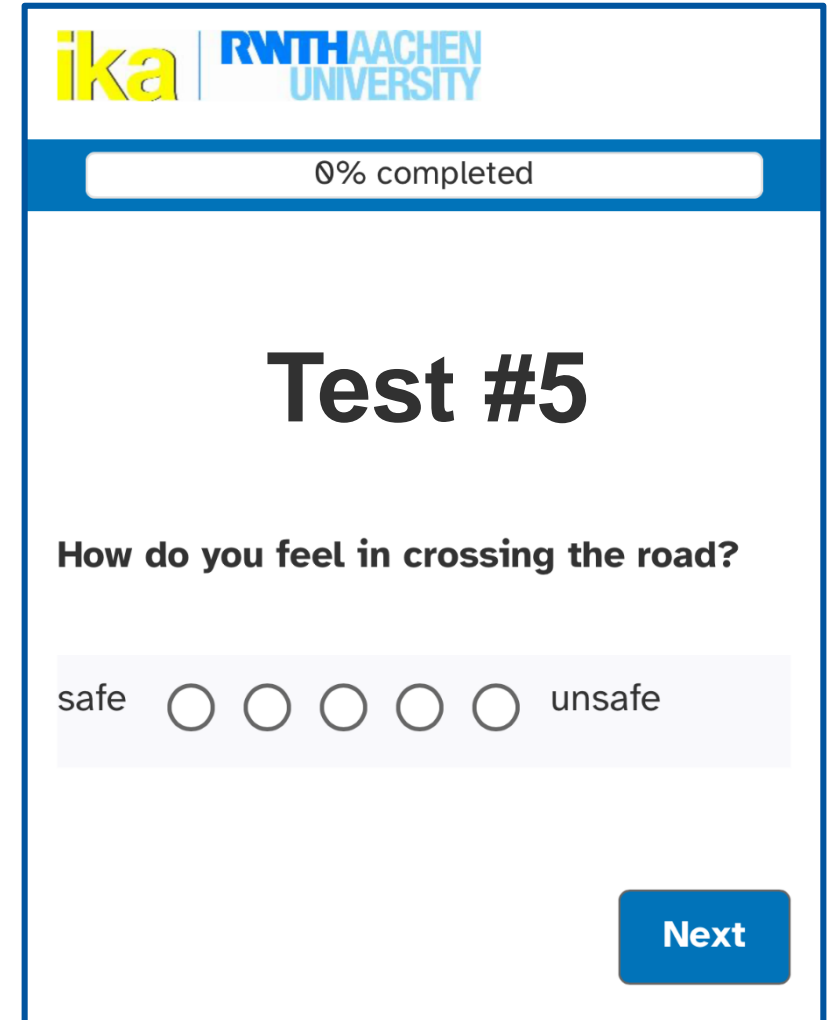
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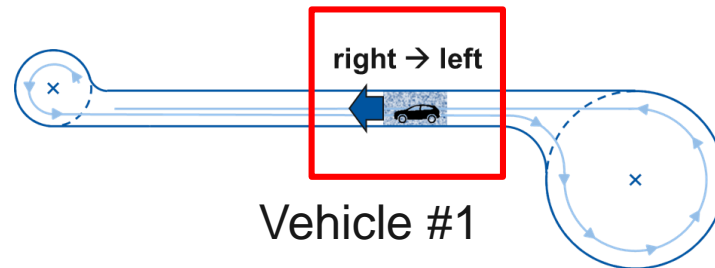




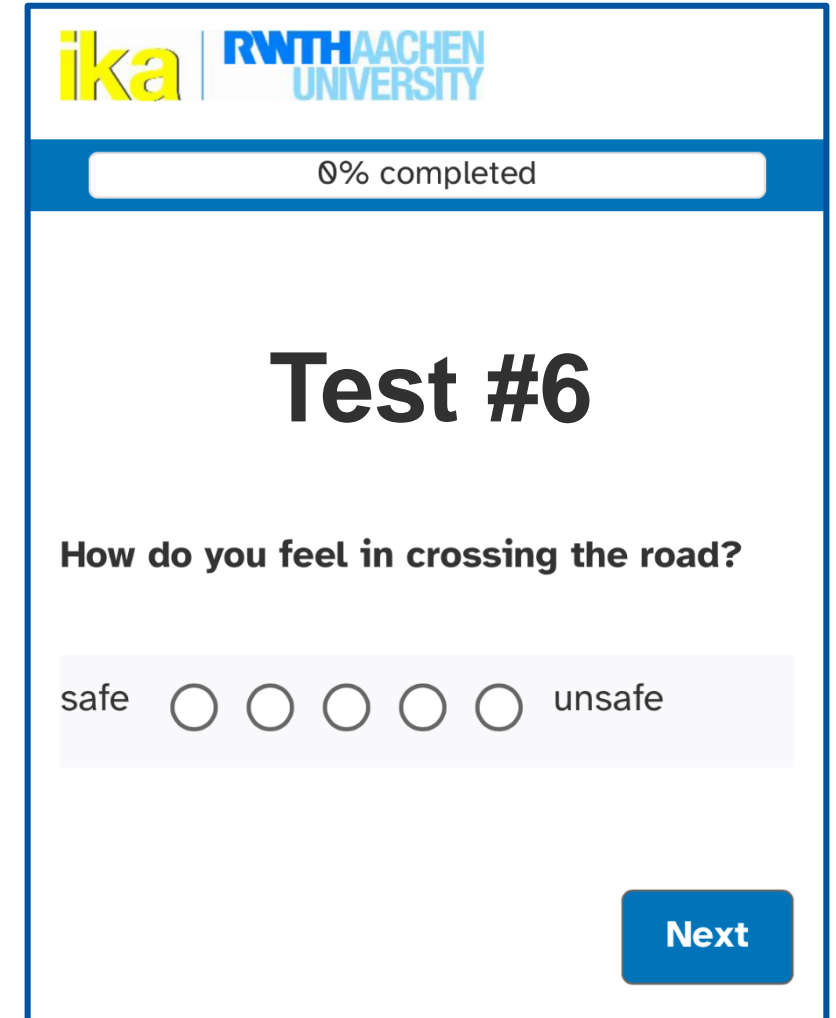
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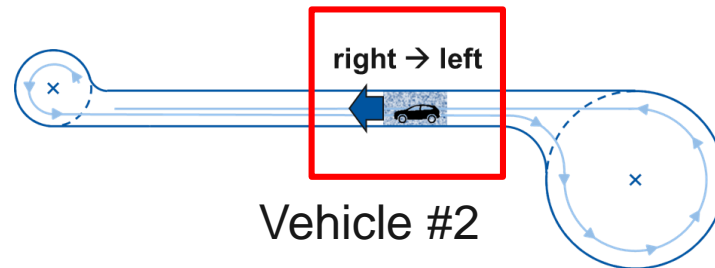
Webbrowser on mobile phones



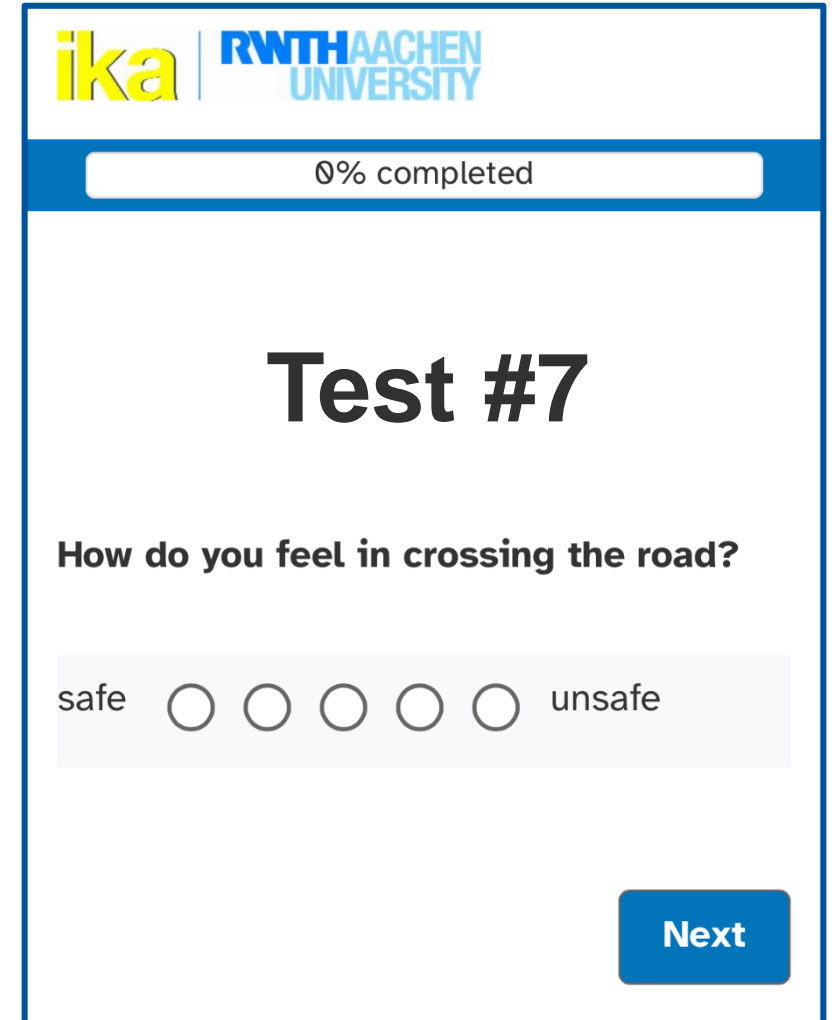
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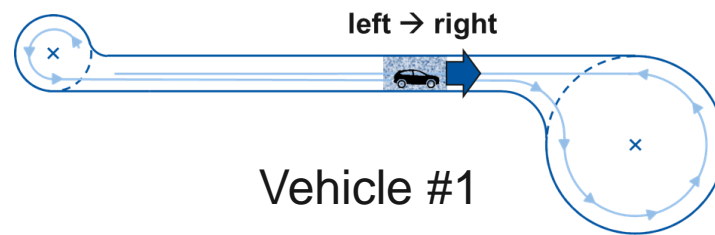
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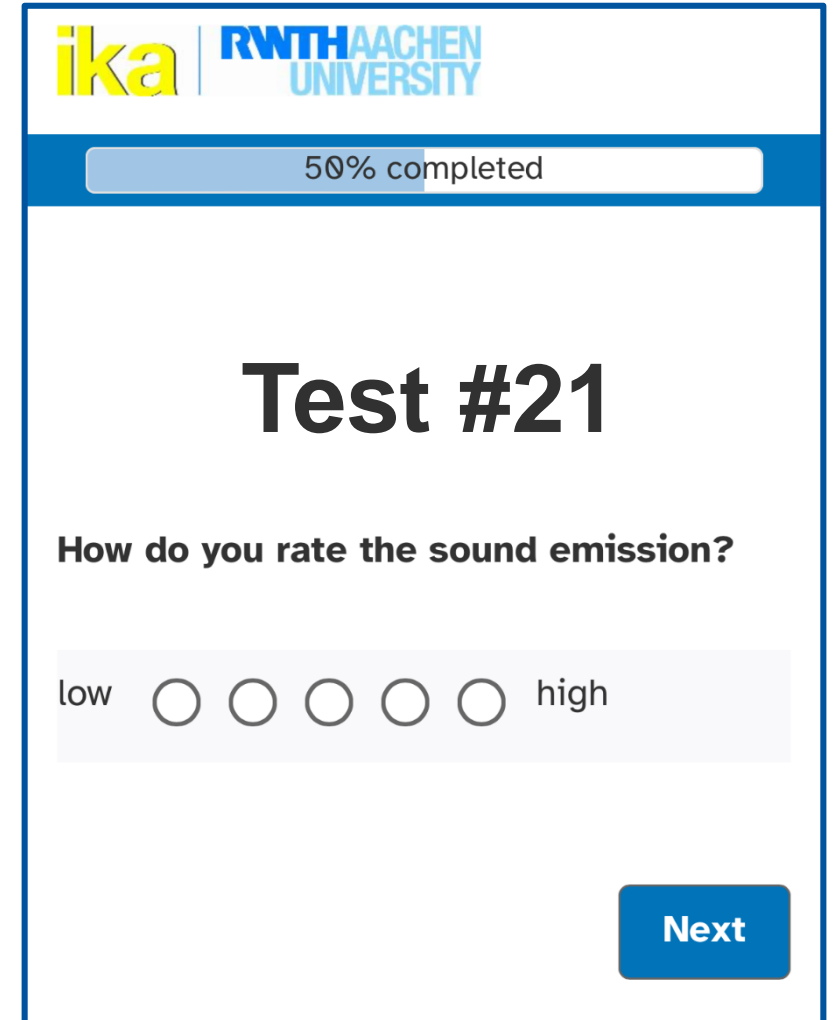
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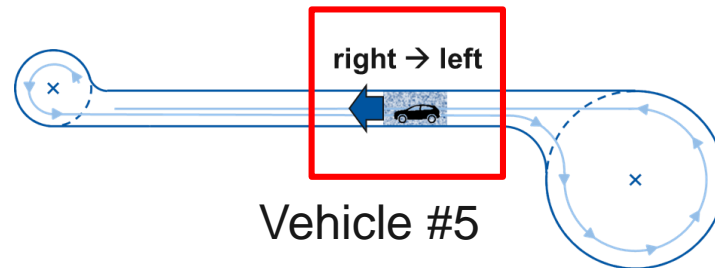
Webbrowser on mobile phones



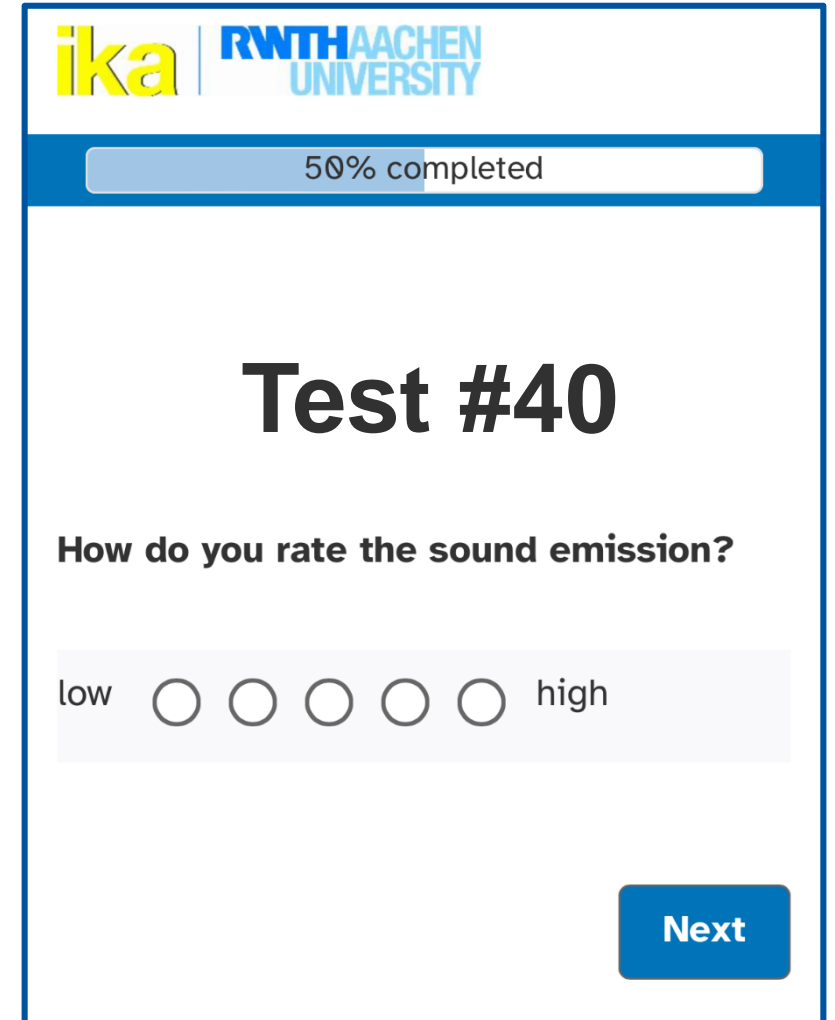
# Capturing the subjective impressions

## Not a study but an experience

QR-Code for Questions  
on test track



Webbrowser on mobile phones



# Capturing the subjective impressions

## Test question for clarification

QR-Code for Questions now



<https://s2survey.net/UNECE/?q=qnr2>

Webbrowser on mobile phones

A screenshot of a mobile browser interface is shown within a red border. At the top, the 'ika | RWTH AACHEN UNIVERSITY' logo is visible. Below it is a progress bar indicating '0% completed'. The main content area displays 'Test #0' in large bold text. Below this, the question 'How do you feel in crossing the road?' is presented. The response options are 'safe' and 'unsafe', with five radio buttons between them. A blue 'Next' button is located at the bottom right of the interface.

# Final words to take with you to the test track

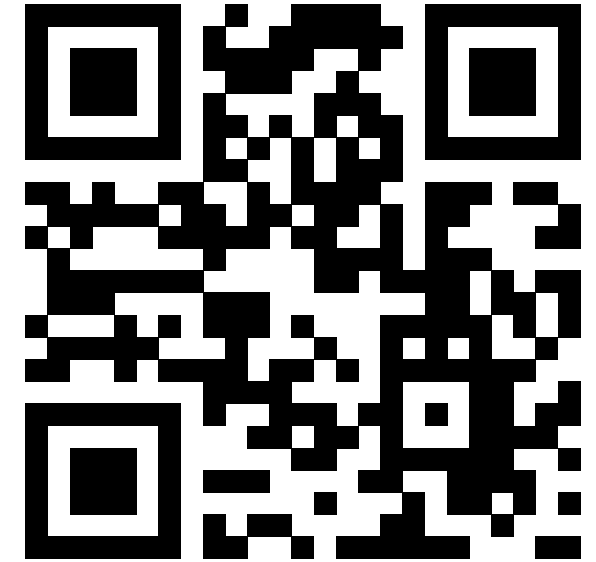
During the test drives, we ask you to keep the following questions in mind:

1. How safe are the vehicles in terms of acoustic perceptibility?
2. How do you rate the sound emission?

→ Now, group #1 can scan the QR codes and go to the test track  
(You find your group number on your badge)



QR-Code for Questions on test track



<https://s2survey.net/UNECE/>

# Contact

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