

자유와 활력이 넘치는  
**파워를 대구**



**FIX** All on AI  
Future Innovation tech eXpo Conference 2025



# The Limits of Proving Ground Testing Testing beyond the regulations

**AVL ZalaZONE - Hungary**

# Who am I?



**M.Kiss Bence**

**Customer Management & Marketing**

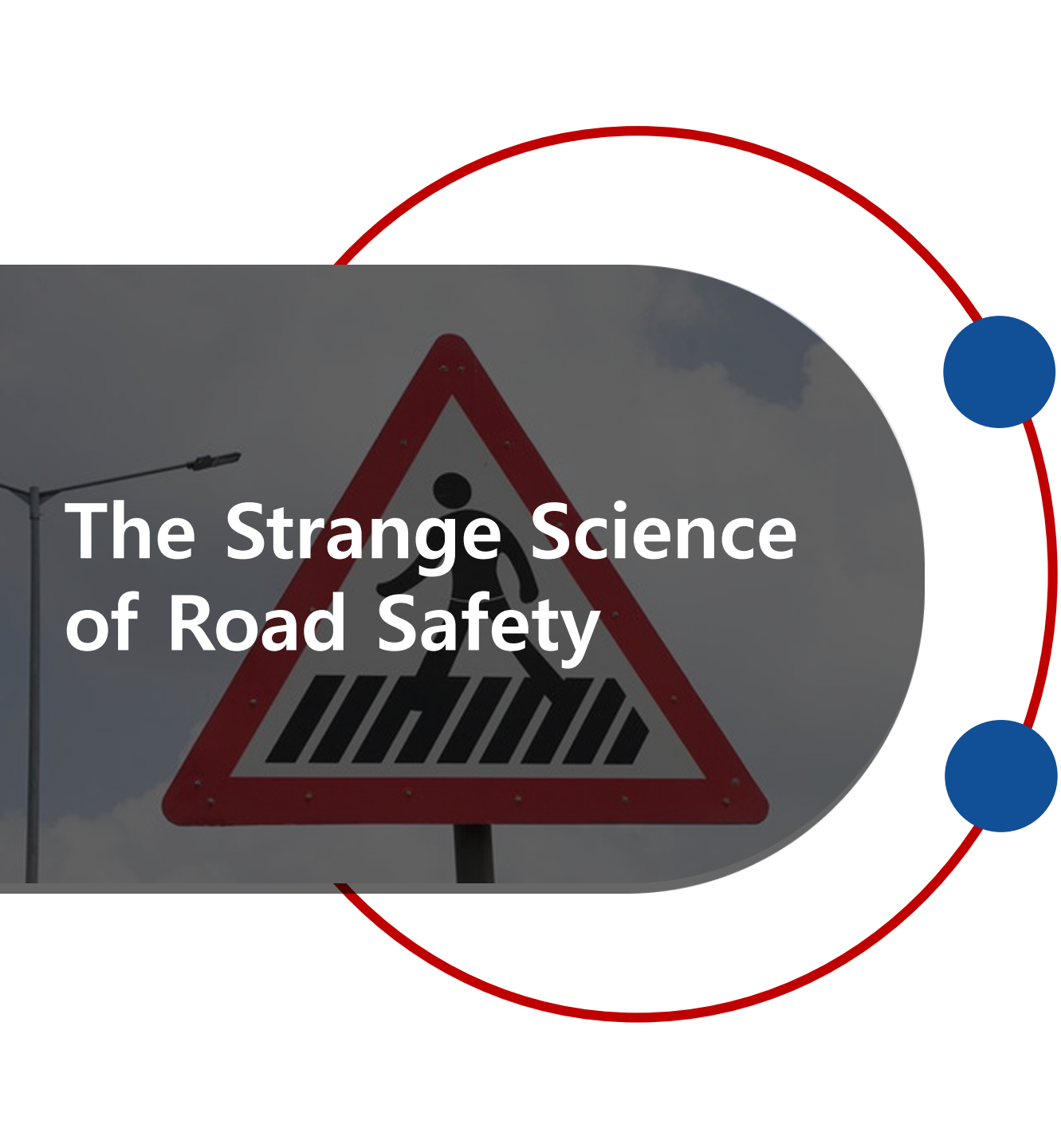
**Public Communication Expert & Economist**

**Campervan fan, aspiring old timer owner**





- 1 What is a Proving Ground and why it is important?
- 2 Proving Ground Trends
- 3 Focus Areas of Proving Ground Testing
- 4 Equipment Used for Proving Ground Testing
- 5 Regulations and Ratings Programs
- 6 How a Foreign OEM Can Enter the European Market
- 7 Why Testing Beyond Regulations Drives Success?
- 8 Case Studies from AVL ZalaZONE



# The Strange Science of Road Safety

Ready for a riddle?

Which EU regulation requires you to  
get 80 people drunk to improve road safety?

# Essential Components of a Proving Ground

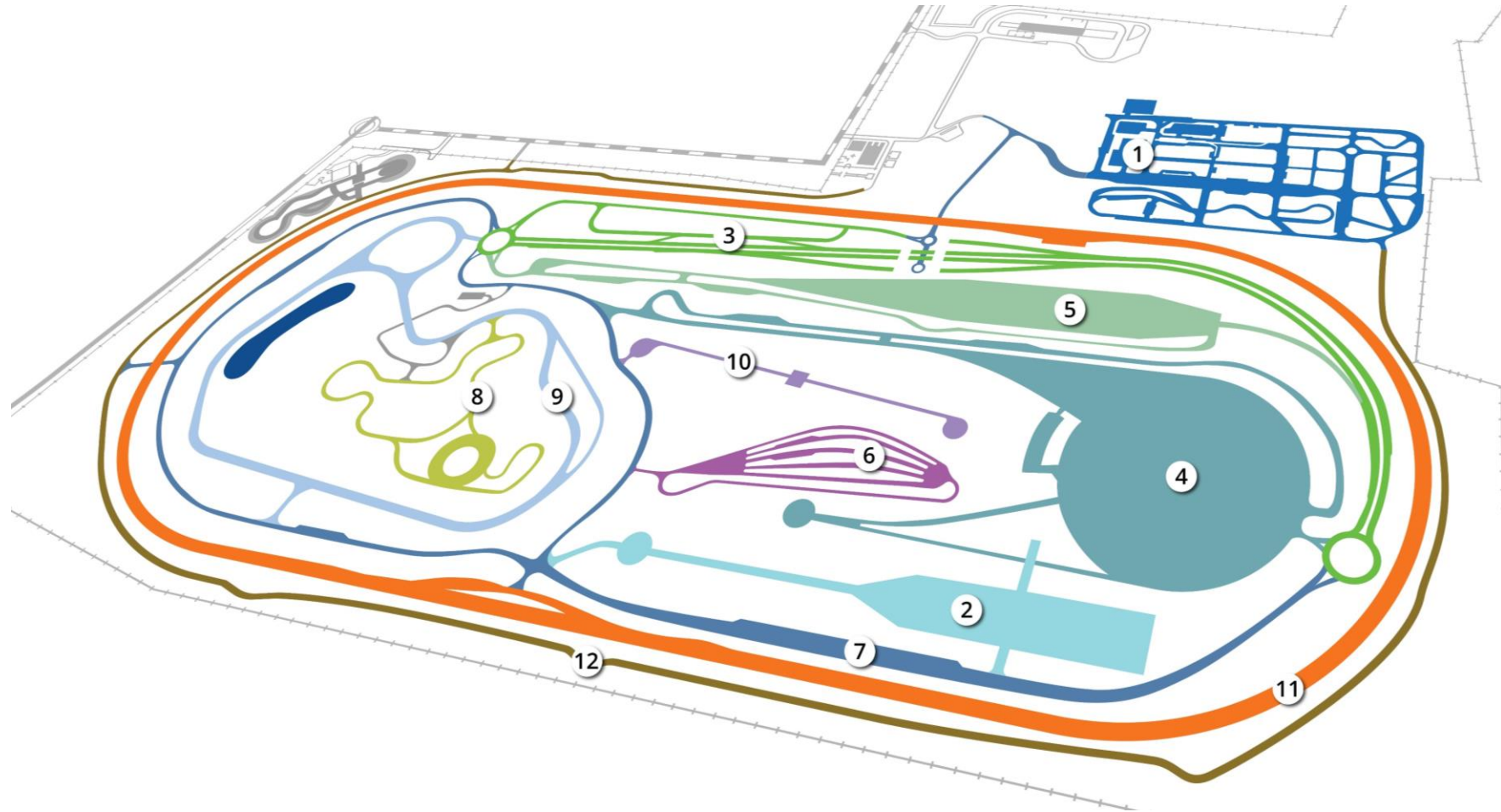


## Special Modules

- ① Smart city zone
- ② ADAS surface
- ③ Motorway
- ④ High-Speed Oval

## Conventional modules

- ⑤ Brake measurement surfaces
- ⑥ Hill tracks
- ⑦ Rural road system
- ⑧ Wet handling course
- ⑨ Handling course
- ⑩ Pass-by noise track
- ⑪ Dynamics Platform
- ⑫ Australian Dirt Road

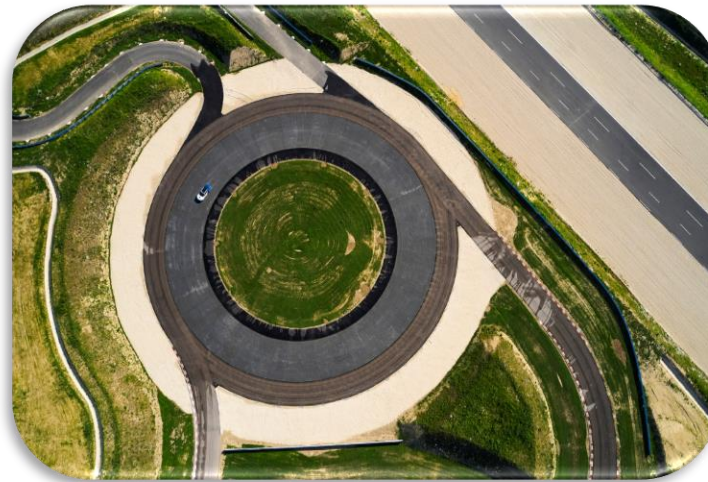


# Conventional Modules at AVL ZalaZONE



## Dynamic Areas

Large, flat asphalt surfaces for high-speed and vehicle dynamics tests such as acceleration, braking, and cornering.



## Handling Courses

Complex curves, sharp corners, and dynamic obstacles — built to challenge drivability, maneuverability, and stability

# Conventional Modules at AVL ZalaZONE



**Brake Measurement  
Surfaces**



**Hill Tracks**



**Pass-by Noise Track**

Our proving ground features Brake Measurement Surfaces, Hill Tracks, and an ISO-certified Pass-by Noise Track, all built to standardized designs. For commercial vehicles, acceleration lanes and surfaces are longer and wider. The Hill Tracks gradients range from 5% to 30%.

# Special modules at AVL ZalaZONE



## High-Speed Oval

4.4 kilometer long, four-lane track with banked curves, designed for tests at speeds of up to 270 km/h.



## Motorway

Realistic environment for highway testing and ADAS validation, including adaptive cruise control, traffic jam assist, and lane keeping.



## ADAS Surface

Dedicated area fully equipped to meet standardized ADAS testing requirements.



## Smart City Zone

Purpose-built urban environment for testing connected and automated vehicle technologies.

## Interconnection of Test Track Modules

Our unique interconnection of track modules with Rural Roads and Highways extends the test area, enabling versatile ADAS and autonomous driving scenarios.

# Functional Zones and Infrastructure



## Test Center

Modern and fully equipped building facility exclusively for testers with workshops and resting areas.



## Separated Event Center

A privacy-protected environment that combines vehicle showcases, industrial and scientific events, and proving ground elements for promotional activities.

# Trends in Proving Ground Testing



## Industries



Passenger  
Car



Commercial  
Vehicle



2 Wheelers



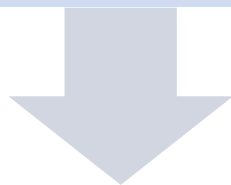
Racing



Tractor/  
Agriculture



Construction



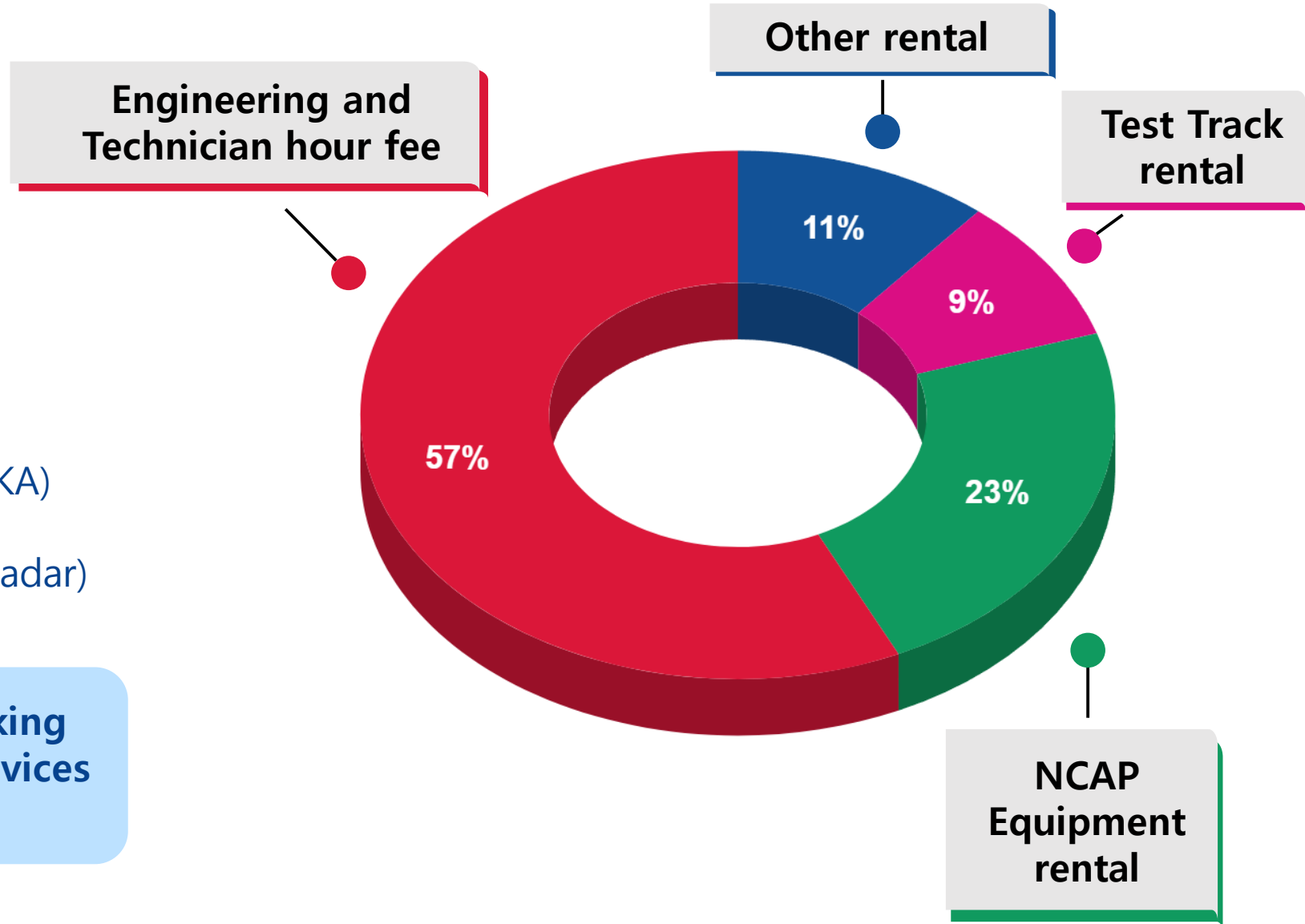
**Significant increase in testing of  
trucks, buses and 2 wheelers**

# Trends in Proving Ground Testing

## Activity highlights (ADAS)

- EURO NCAP (2023) Pre-Test
- ADAS Type Approval Pre-Test
- ADAS Type Approval Test
- ADAS Functional testing (AEB, LKA)
- ADAS Sensor testing (Camera, Radar)

Customers are increasingly seeking all-in-one solutions or partial services rather than just track rental



# Available VRU and C2C targets



## VRU Targets



## C2C targets



# Robotized Moving Platforms



## VRU Platforms



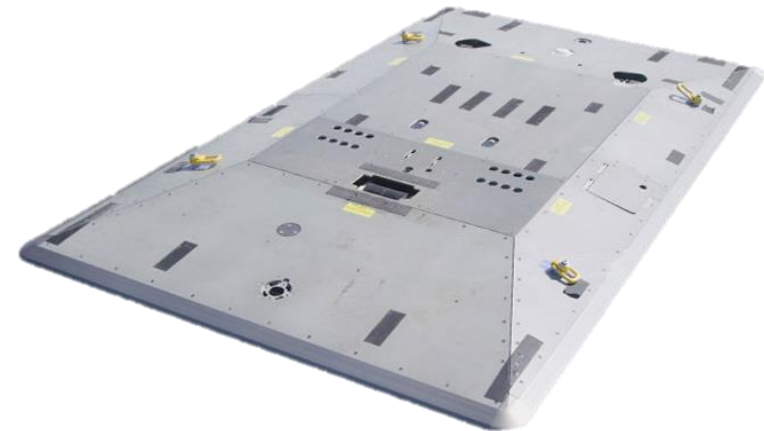
AB Dynamics

SPT20

Launchpad50

Launchpad80

## C2C Platforms



AB Dynamics

GST100

GST120

# Driving Robot Systems



## Steering



AB Dynamics

2 x SR60 Orbit

1 x Halo

1 x Halo

## Pedal



AB Dynamics

3 x CBAR600

1 x CBAR1000

# Inertial navigation systems



5 x ABD Pinpoint 2G



4 x OxTS RT3000 v3 incl.  
RT-Range



RT Base S  
mobile RTK base  
station incl. 869MHz  
Satel radio modems



Local NTRIP  
service including  
free client  
account

# Drive-by-wire robotized target vehicle

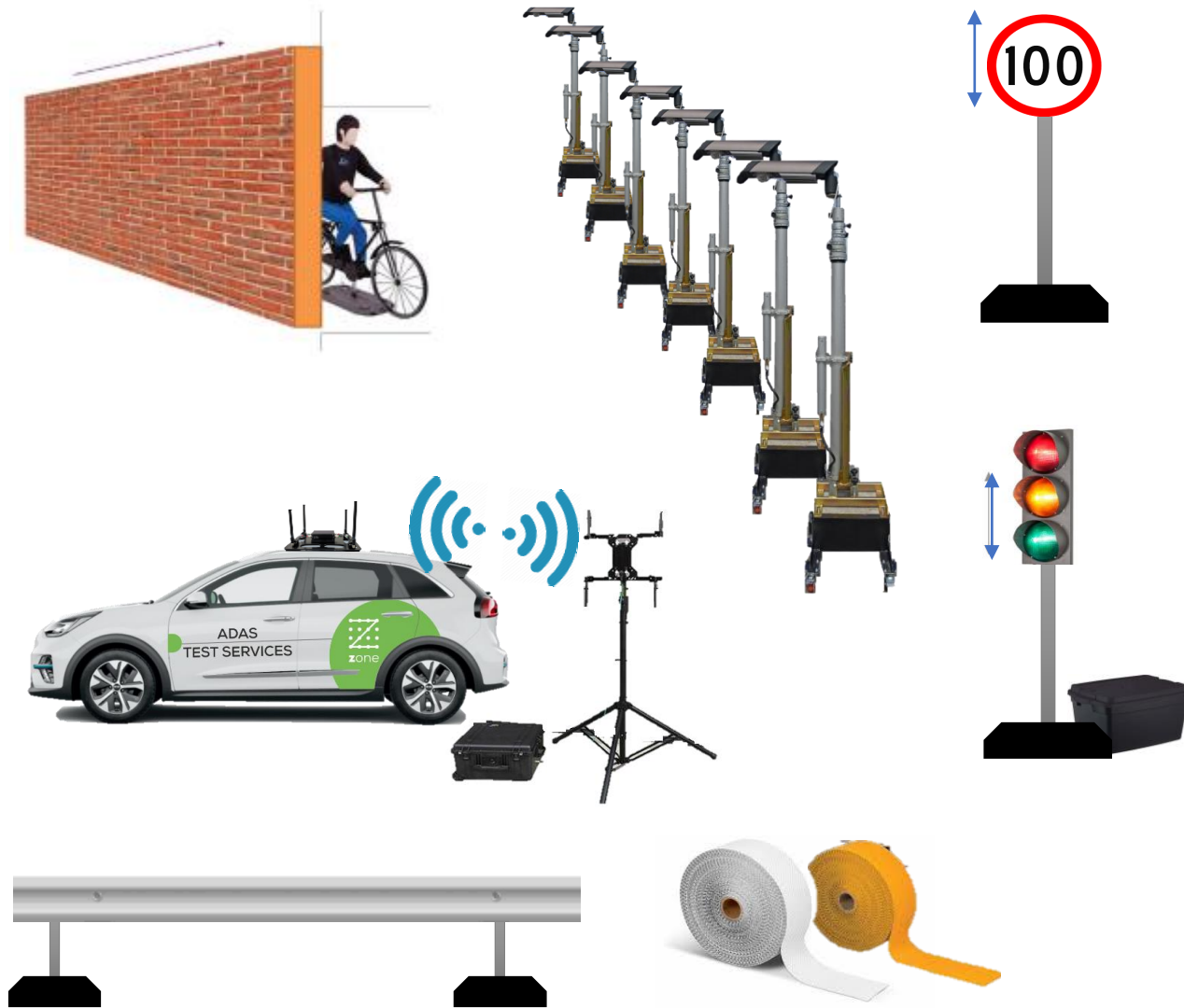


## KIA Niro Hybrid with AEB, LSS, ACC

- Drive-by-wire control via AB Dynamics Flex-0
- For synchronized control of a real car
- DbW functionality based on vehicle's own systems (steering, braking, acceleration)
- Human driver necessary for safety reason
- Full integration with AB Dynamics test system



# Other equipments



- Real target vehicles
- Obstruction wall panels (3 x)
- NCAP-approved illumination lamp units (7 x)
- White and yellow temporary lane markings (3M)
- Local Wi-Fi antenna units (Rajant Powermesh + OxTS XLAN)
- Private 4G/5G mobile communication network
- OxTS RT backpack
- Mobile road signs & Traffic lights
- Drone for video capturing



# What is Active and Passive Safety?



## Active Safety

**Preventing accidents  
before they happen**

Basic active systems

- Anti-lock Braking System (ABS)
- Electronic Stability Control (ESC)
- Traction Control
- Brake Assist
- Advanced active systems (ADAS)
- Adaptive Cruise Control (ACC)
- Lane Keeping Assist (LKA)
- Automatic Emergency Braking (AEB)
- Blind Spot Monitoring (BSM)

## Passive Safety

**Protection during and  
after impact**

Minimizing injury once an accident occurs

- Vehicle structure: crumple zones, reinforced passenger cell
- Restraint systems: seatbelts, airbags, headrests
- Interior design: energy-absorbing materials, optimized cabin layout
- Post-crash safety: automatic fuel cut-off, emergency call systems (eCall)

## Regulations (mandatory requirements)

- These are **laws and official rules** set by governments or the EU. Every brand **must follow** them if they **want to sell cars**.
- Example: mandatory seatbelts, airbags after a certain year, or emission limits for engines.
- They don't give ratings — instead, they **define a minimum standard**. If a car doesn't comply, it cannot be approved for the market.
- Regulations keep getting stricter to **make cars safer** and more **environmentally friendly**.



General Safety  
Regulations



## Rating Programs (e.g., Euro NCAP)

- These are tests and evaluations done by **independent organizations** to show how safe a car is.
- **Euro NCAP** (European New Car Assessment Programme). They perform crash tests and check safety systems, then give the car a **star rating**.
- More stars = better protection for passengers, pedestrians, and more advanced safety systems (like automatic emergency braking).
- These programs are **not mandatory**, but they are very important because customers often look at them when choosing a car.



# How many days does it take to complete an EU Type Approval?

1.

**Initial estimate** – based on the provided test durations, the full package requires approximately **32 days**.

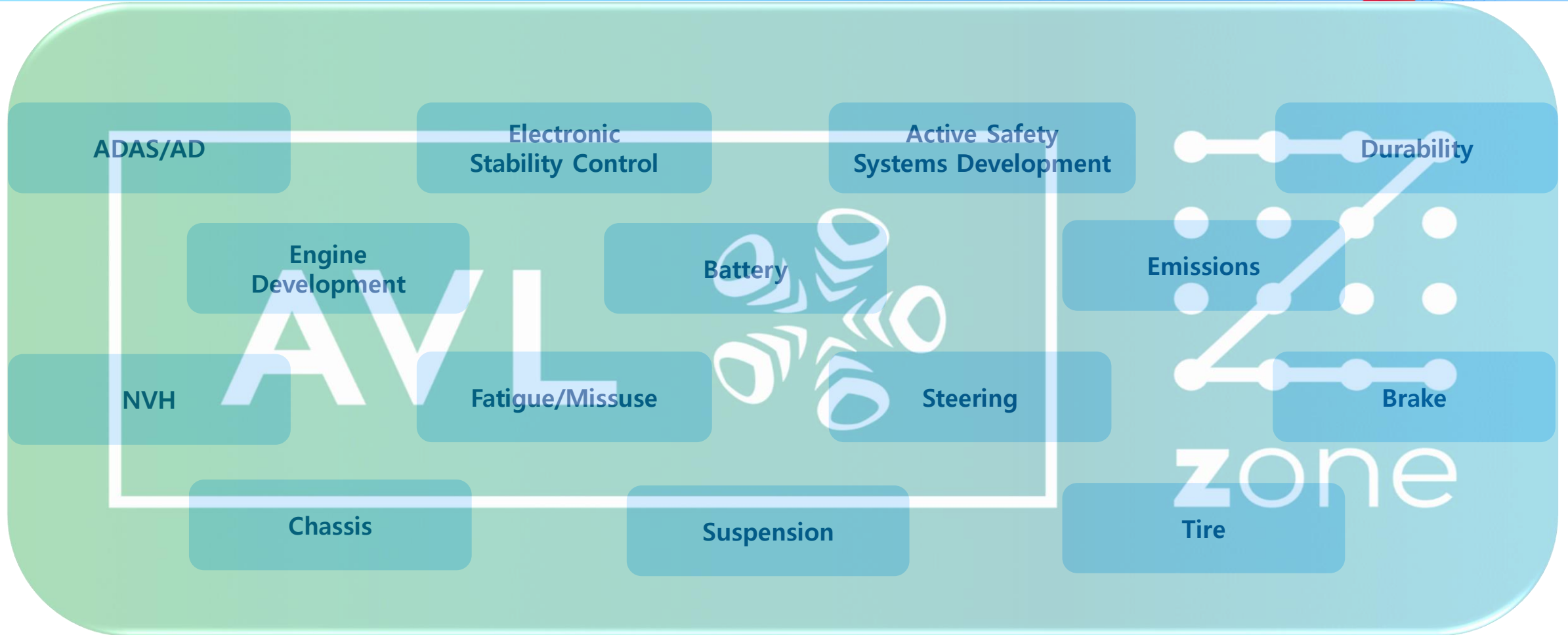
2.

**Practical perspective** – if conducted continuously, the package represents around **1.5 months of dedicated testing**.

3.

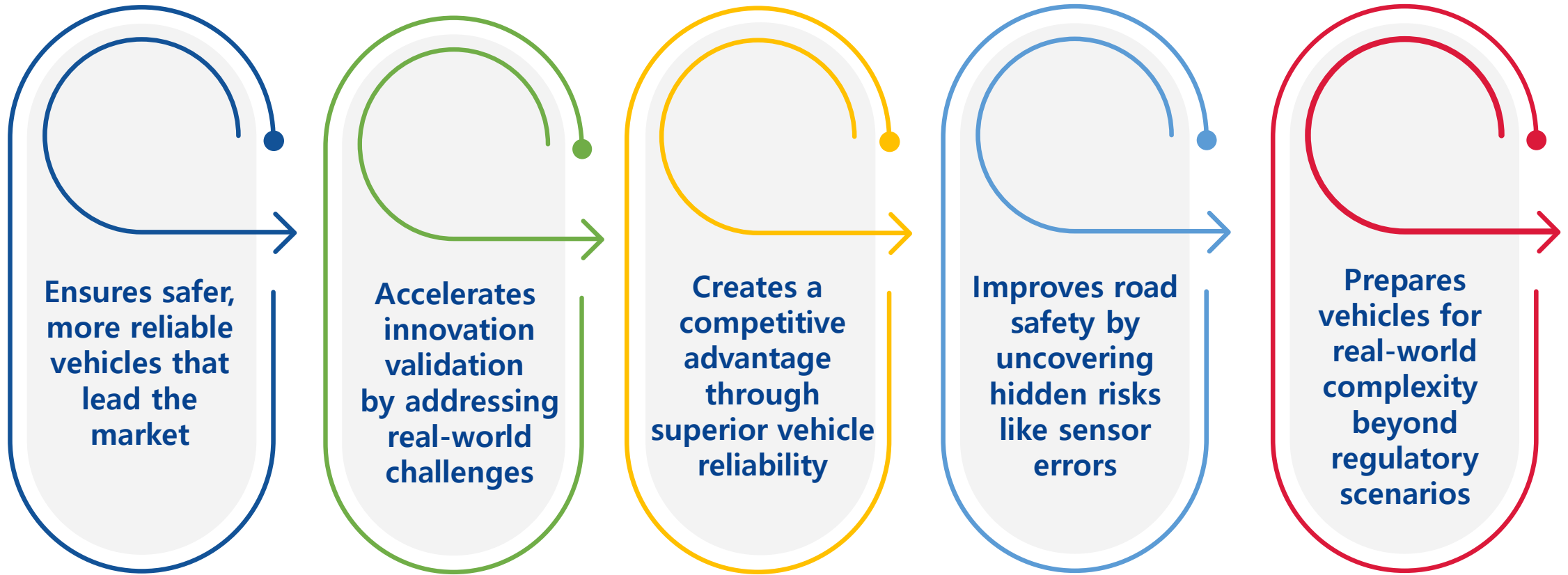
**Preparation time & Uncertain elements** – preparation times are already **counted in total**, but several tests still lack precise estimates, so the total duration may extend further.

# Typical Test Scenarios



**AVL ZalaZONE Proving Ground is capable of testing all types of vehicles, including driver assistance systems, on diverse surfaces in realistic environments.**

# Why Testing Beyond Regulations Drives Success?





# Self-driving cars at AVL ZalaZONE



Turkey's first SAE Level 4 **self-driving shuttle** was tested at the AVL ZalaZONE **Smart City** module.



Turkey's self-driving shuttle

- Collision avoidance & emergency braking
- Safe navigation through intersections & roundabouts
- Bus stop docking & departure
- Interactions with pedestrians and other road users



1-3 month testing time

# High-Speed Oval ADAS Usage Example



High Speed Oval is also ideal for **testing heavy-duty** and **40-ton vehicles**, providing a safe, repeatable environment for:

- **High-speed ADAS validation** (ACC, AEB, lane keeping, and lane change assist) under full payload conditions.
- **Sensor performance testing** (radar, lidar, camera)
- **Vehicle stability, braking,** and **handling** at highway speeds.



High-Speed ADAS validation



No weight restriction at ZalaZONE

# Special ADAS Testing Scenarios at AVL ZalaZONE



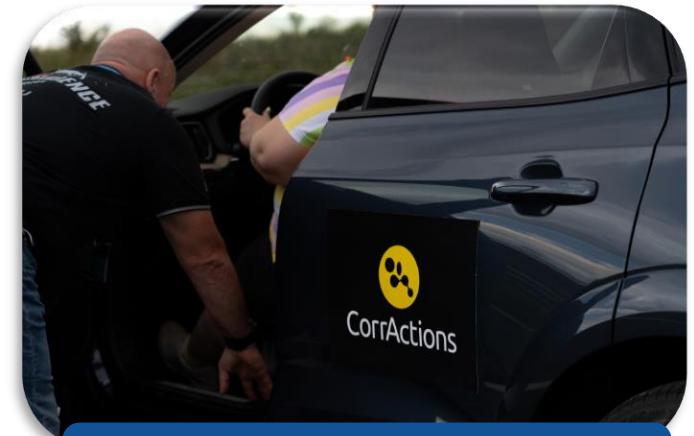
- Unique **large-animal scenarios** simulating wildlife crossing – avoidance and braking maneuvers
- Highway **wheel-change scenario** with dummy simulating a person working beside the road
- Use of special dummies such as **wheelchair users** and **shopping cart pedestrians**
- **Real motorcyclist testing** – enabled by AVL ZalaZONE's flexible safety setup, using a **backpack-mounted localization** unit for precise tracking



# Human-aware AI in action

- **AI-based**, software-only Driver Monitoring Systems **detecting driver's cognitive state** in real time
- Tested and validated at AVL ZalaZONE **under controlled alcohol impairment** studies
- Anticipates 2026 Euro NCAP and future regulatory requirements
- **No wearables, no cameras** — uses micro-movements and built-in vehicle sensors
- At every stage – before and after driving – **blood alcohol content** (BAC) was measured to ensure traceability, consistency, and full legitimacy

This collaboration went **beyond testing**; it was about trust, technology, and pushing boundaries. Proving grounds like **AVL ZalaZONE** provide the **real-world environment** where AI-based driving software can be safely tested, validated, and optimized.



80 hours of monitored driving



80 drivers under controlled intoxication

# From innovation to trust — it all begins on the Proving Ground.



Proving grounds are the essential foundation for automotive innovation — they enable rigorous, real-world testing that ensures vehicles are safe, reliable, and ready for tomorrow's challenges.

Without these specialized facilities, advancing ADAS and autonomous technologies to the highest safety standards would be impossible. They are the bridge that turns innovation into real-world trust.

# Thank you



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