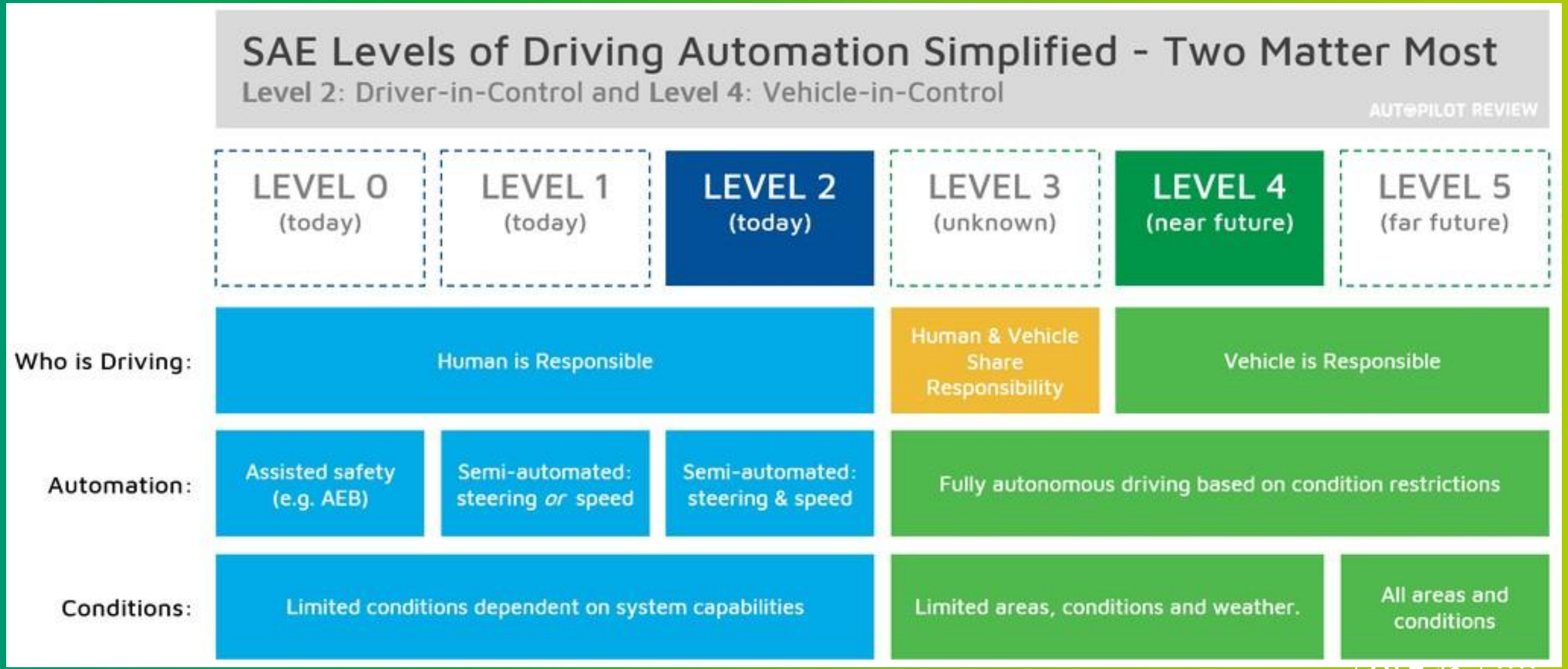
AVL ZalaZONE

Current developments and domestic implications of self-driving vehicle technology

2025 MABISZ conference

Levels of automation



Source: AutoPilot Review

Development activities

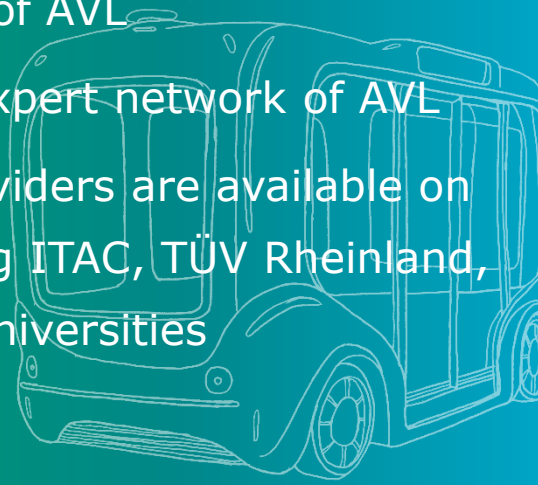
Players in Hungary

- AiMotive
- AuMovio (Continental)
- AVL Hungary
- BME
- BOSCH
- Jaguar Land Rover
- Knorr-Bremse
- Ministry for Building and Transport (ÉKM)
- ThyssenKrupp-Presta
- TÜV Rheinland
- QTICS/JÁFI
- Széchenyi István University
- SZTAKI
- SZTE
- ZalaZONE

About us

AVL ZalaZONE provides a 250-hectare vehicle proving ground in the west of Hungary. It is specifically designed for the development and validation tests of autonomous vehicles, while also available for the dynamics and durability tests of conventional vehicles.

- Combined engineering, testing and simulation know-how of AVL
- Global footprint and expert network of AVL
- Technical services providers are available on our test track including ITAC, TÜV Rheinland, with several partner universities



AVL ZalaZONE at Glance

2019
Founded

250
Hectare Test Facility in the middle of Europe

13
Different Modules

400
Guest Conference Capacity

3
Unique Modules for ADAS/AD Testing

25
Offices for Testers

13
Double Workshops

5G
Network

Proving Ground Layout

AVL ZalaZONE was designed to focus on the future:

Unique track modules combined with conventional track elements

ADAS/AD elements

1 Smart city zone

2 ADAS surface

3 Motorway

Conventional modules

4 Dynamics platform

5 Brake measurement surfaces

6 Rural road system

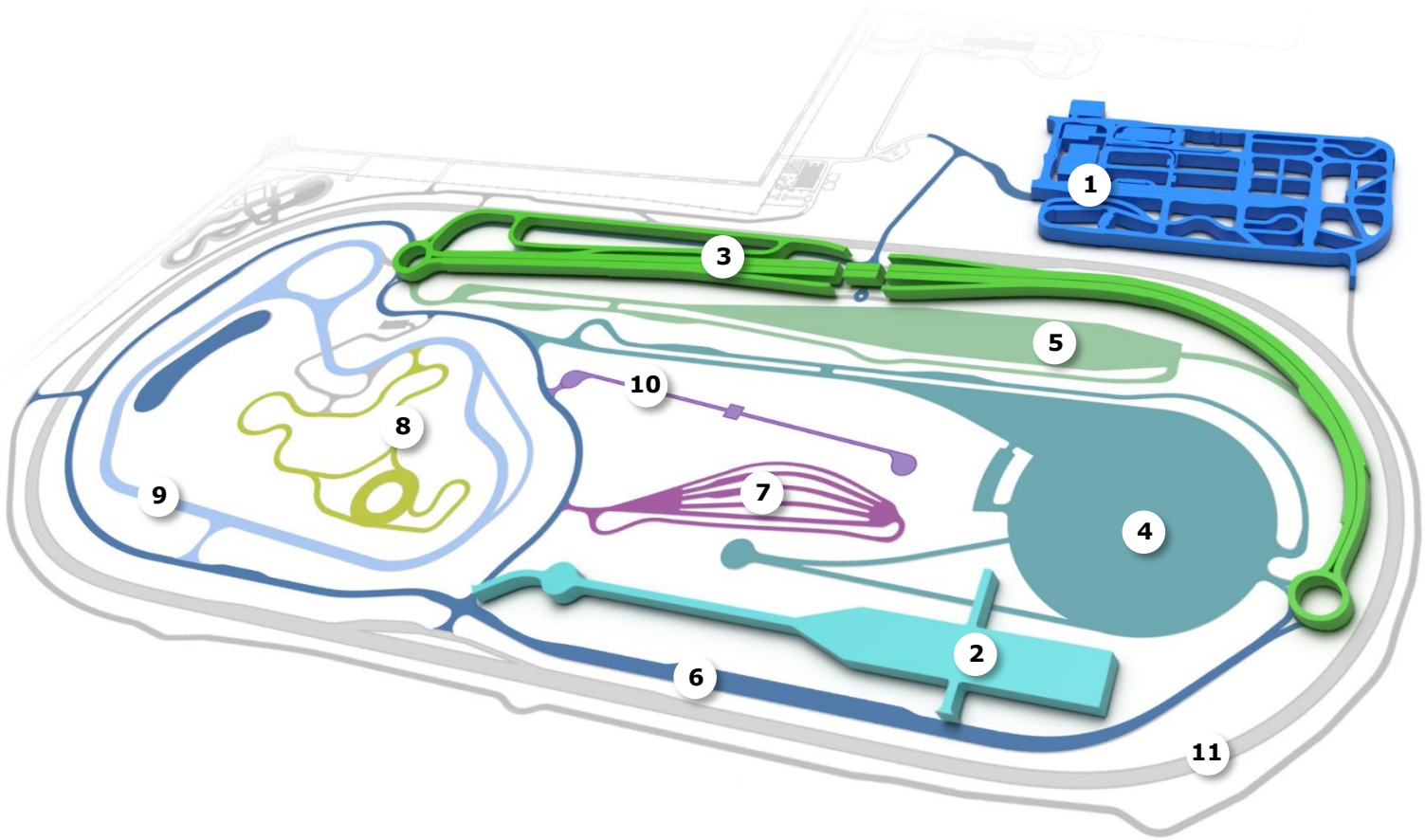
7 Hill tracks

8 Wet handling course

9 Handling course

10 Pass-by noise track

11 High-Speed Oval



Motorway

Purpose of the motorway is to provide a realistic environment for highway-related testing and validating of ADAS systems like adaptive cruise control, traffic jam assist, lane keeping, etc.

1500 m

Length

960 m

Straight Section

540 m

Curve Section with **340m** Radius

2x2 lanes

With Emergency Lane

- **2 different entrances and exits**
- **Motorway bridge for sensor disturbance scenarios**
- **Different barrier set-ups**

ADAS Surface

The ADAS surface is a dedicated area that fulfils all the requirements of standardized ADAS testing and a cost-effective alternative to the dynamics platform as well. With the necessary active equipment, it can fulfill almost all ADAS related requirements.

250x60 m

Action Surface

650 m

Overall Length

130 km/h

Speed

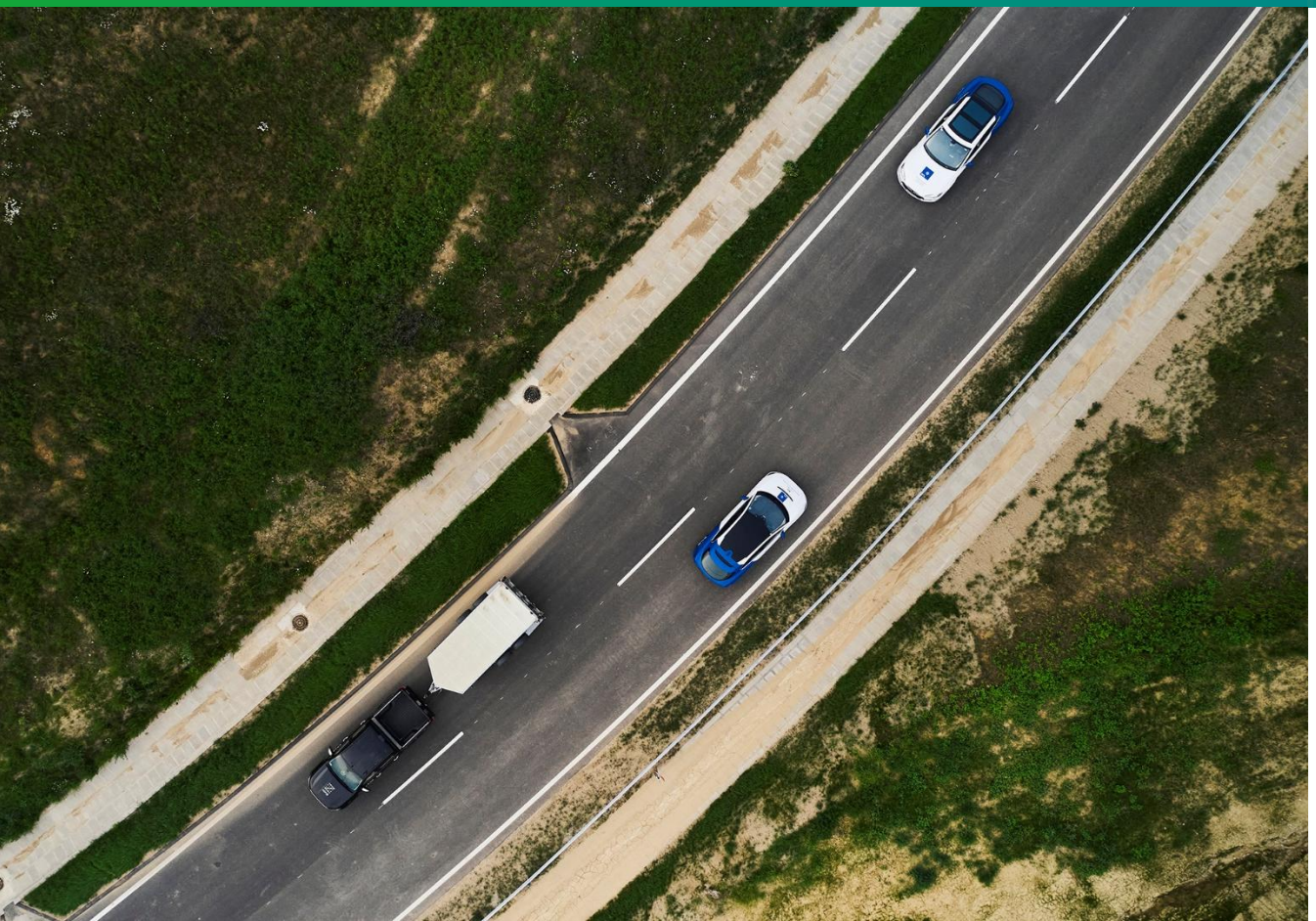
400 m

Long Acceleration Lane

- **Environment for certified NCAP/ADAS tests**
- **Engineering service for testing AEB, SAS, ACC, LKA LSS systems**
- **Equipments on-site: VRU dummies, GVT, moving platforms, driving robots, drive-by-wire vehicle**

Rural Road System

Ideal for any non-safety critical maneuvers like traffic sign recognition. It consists multiple road conditions or circumstances like commuting frequency, the change of road gradients and elevations.



2500 m
Total Length

500 m
Multilane

130 m
10% Banked Road Section

- **Various topographies**
- **Realistic, public road like layout**
- **Segments can be closed for exclusive usage**

Smart City Zone

Smart City Zone provides a unique purpose-built city environment for testing the functionality of connected and automated vehicles and related technologies.

15 ha
Testing Area

5 km
Overall Street Length

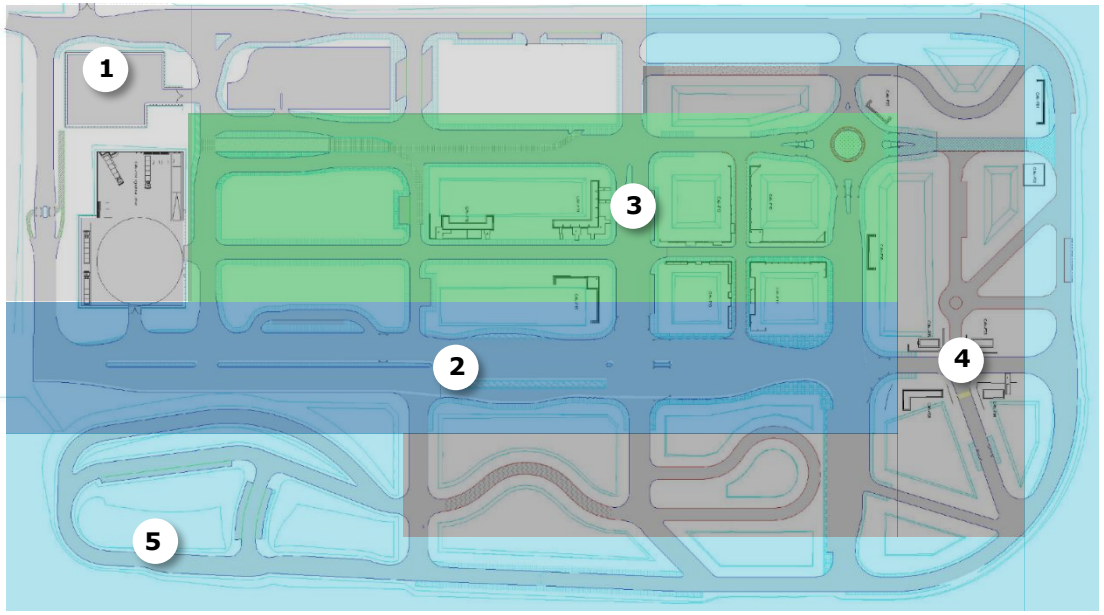
600 m
Lenghts of Facades Area

10 m
Max. Building Height

- **Main street 400m, 2x3 lanes**
- **Additional elements: low-mue crossing, hilly section, logistic yard, bus bay**
- **Fully realistic building facades**
- **Realistic materials and design**
- **Construction zone, pedestrian crossings, trees, moveable road signs, roadside objects**

SUB-Modules of Smart City Zone

1 Low-speed, manoevering area (parking and LogYard)



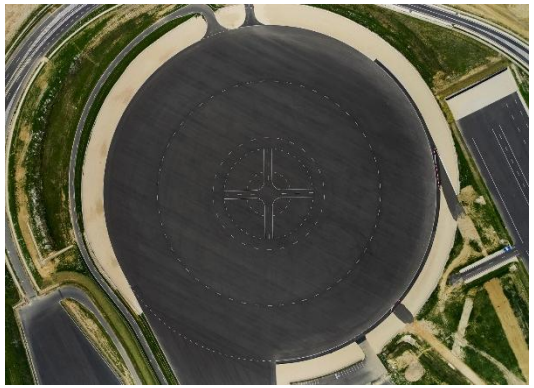
3 Downtown area with high facades

2 Multi-lane high speed area

5 T-junction area with hill

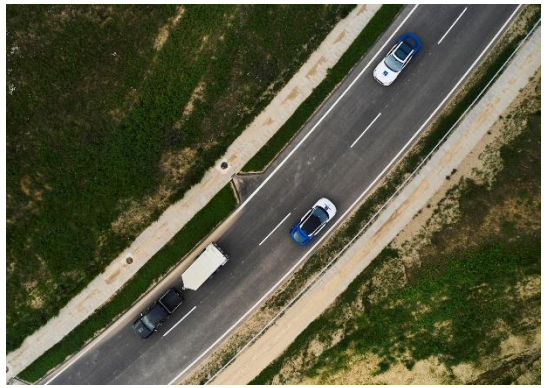
4 Suburban area with industry park

Conventional Modules



Dynamics Platform

Brake Measurement Surfaces



Rural Road System

Hill Tracks

High-speed oval

Wet Handling Course

Handling Course

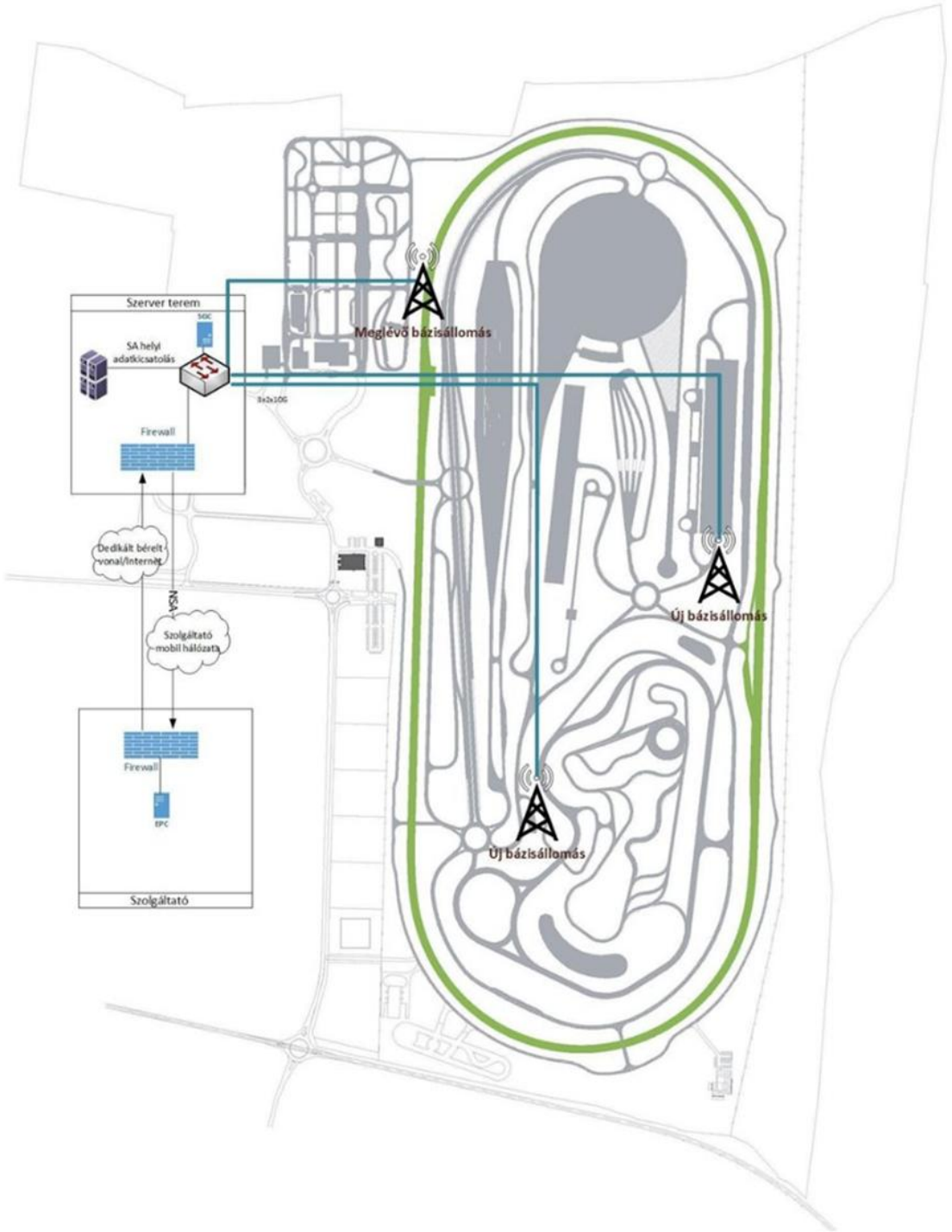
Pass-by Noise Track

AVL zone

First 5G Covered Area in Hungary

Communication Network

- Fully coverage of test track
- 5G cellular test network available for future ITS applications (T-System, Vodafone)
- V2X test equipment :
  - Cohda Wireless RSU + OBU (ZalaZONE R+I support)
- Redundant physical layout for parallel customer networks
- Vehicle development targets and attributes



Scope of ADAS-related engineering activity

AEB (Autonomous Emergency Brake)

Euro NCAP AEB C2C

Euro NCAP AEB VRU

FCW (Forward Collision Warning)

Euro NCAP AEB C2C

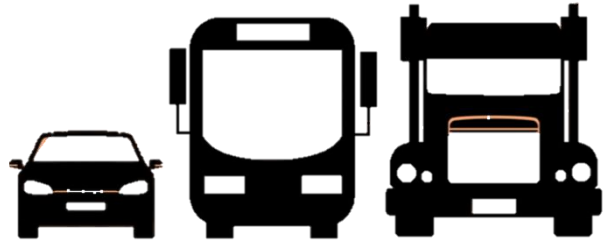
Euro NCAP AEB VRU

LSS (Lane support system: LDW, LKA, ELK)

Euro NCAP LSS

SA (Speed Assist)

Euro NCAP SA



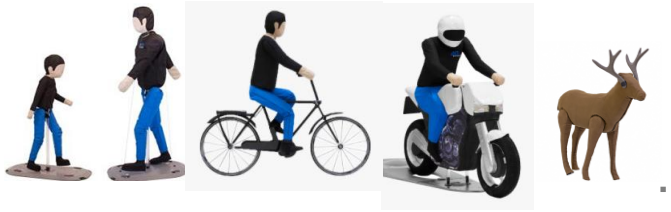
European Commission

General Safety Regulations

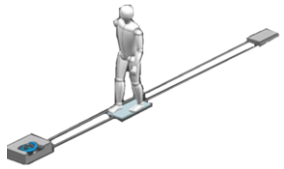
Japan New Car Assessment Program

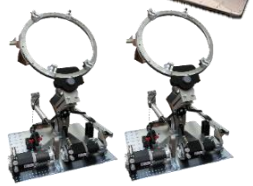
Test equipment

Targets



Carriers/actuators



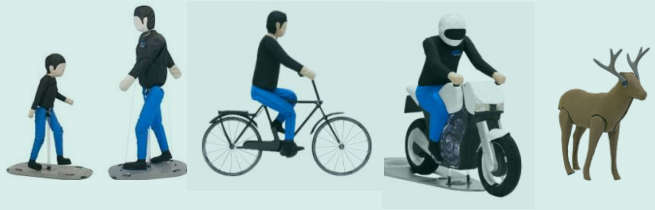


Localization, synchronization

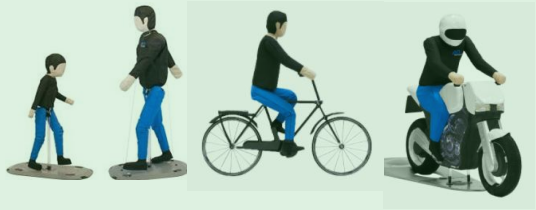
High level controller

Available VRU and C2C targets

VRU targets



C2C targets



Robotized moving platforms

VRU platforms

AB Dynamics	1 x SPT20	1 x Launchpad50	1 x Launchpad80

C2C platforms

AB Dynamics	1 x GST100	1 x 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

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**

Inertial navigation systems & available RTK correction services

1 x OxTS RT3000 v3 incl. RT-Range

5 x ABD Pinpoint 2G

3 x OxTS RT3000 v3 incl. RT-Range

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

Local NTRIP service including free client account

Supplemental components for ADAS/AD testing

- **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**
- **Drone for video capturing**

ADAS & AD testing support

- Public road testing of autonomous functions easily possible
- Driver service within customers scenarios
- Robot and/or localization installation
- Different target vehicles
- Cone setup according to customer’s needs
- Mobile watering system
- Lane marking setup
- Setup of static dummies
- Vehicle loading

Lessons learned

- ADAS developments are dominating today, L3-L5 developments have at the moment lower priority
- Customers are asking tipically for series development related services (NCAP, GSR, ISO scenarios or similar)
- Homologation, pre-homologation services have high importance from customer point of view
- During homologation tests accuracy has a crutial role, huge differences (engineering judgment) between different customers/technical service providers
- Compatibility with legal requirements on physical infrastructure level is a huge challange (e.g increasing manouver speeds)
- V2X customer projects run with very low intensity
- Flexibility, flexibility, flexibility...

Thank you

AVL zone

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