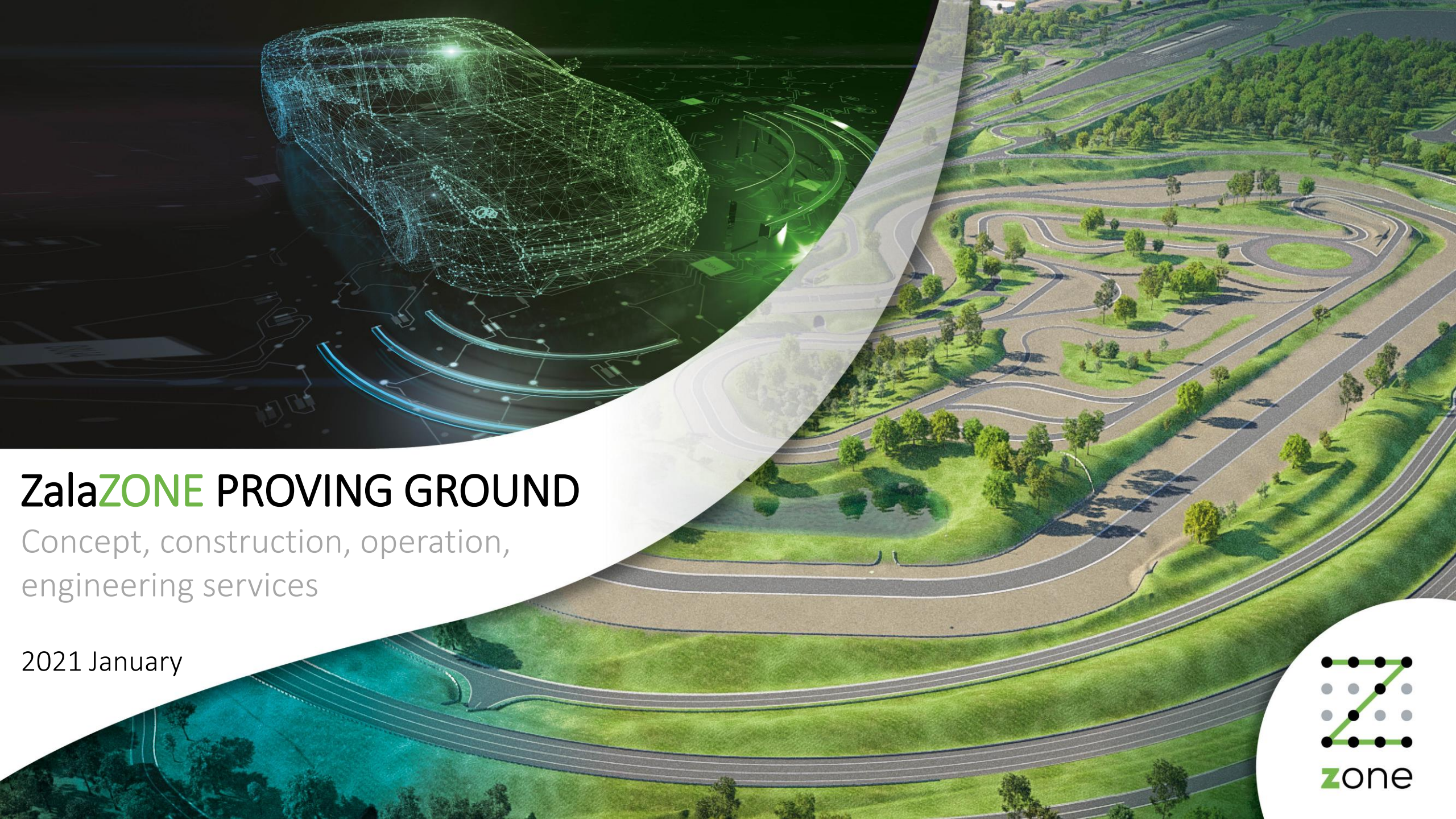


ZalaZONE PROVING GROUND

Concept, construction, operation, engineering services

2021 January

2014-2017

Industrial partners

thyssenkrupp

commsignia

vodafone

KNORR-BREMSE

Continental

T··Systems·

ERICSSON

ZF

NATIONAL INSTRUMENTS

BOSCH

AVL

AIMOTIVE

TÜVRheinland®

NOKIA

zone

Test track vision 2017

Industrial requirements

- Be able to prove all test's levels of development process, including the AD tests
- A full range service for customers have to provide on-site (fueling, electric charger, meal, office, workshop etc.)
- Flexible connectable tracks for special events and tests
- Handling of prototype vehicles has to be conform with international accepted standards. The test modules should be visually separated, the development and the public areas should be fully separated
- Public road test opportunity for autonomous vehicles
- Representative, attractive environments for presentations and conferences

zone

Test track vision 2017

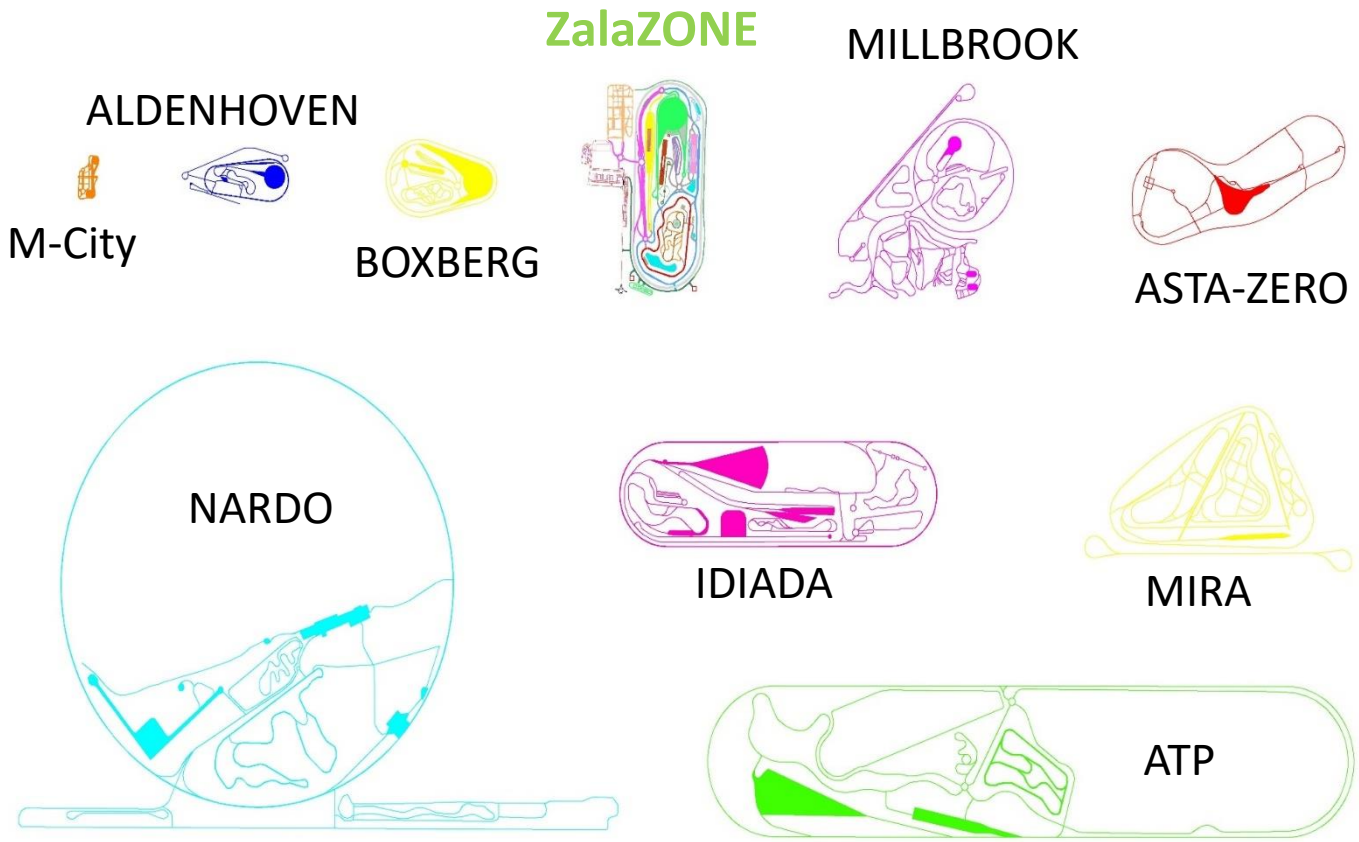
International benchmark tracks

Benchmarks dynamic tracks:

- IDIADA (Barcelona)
- ATP (North Germany)

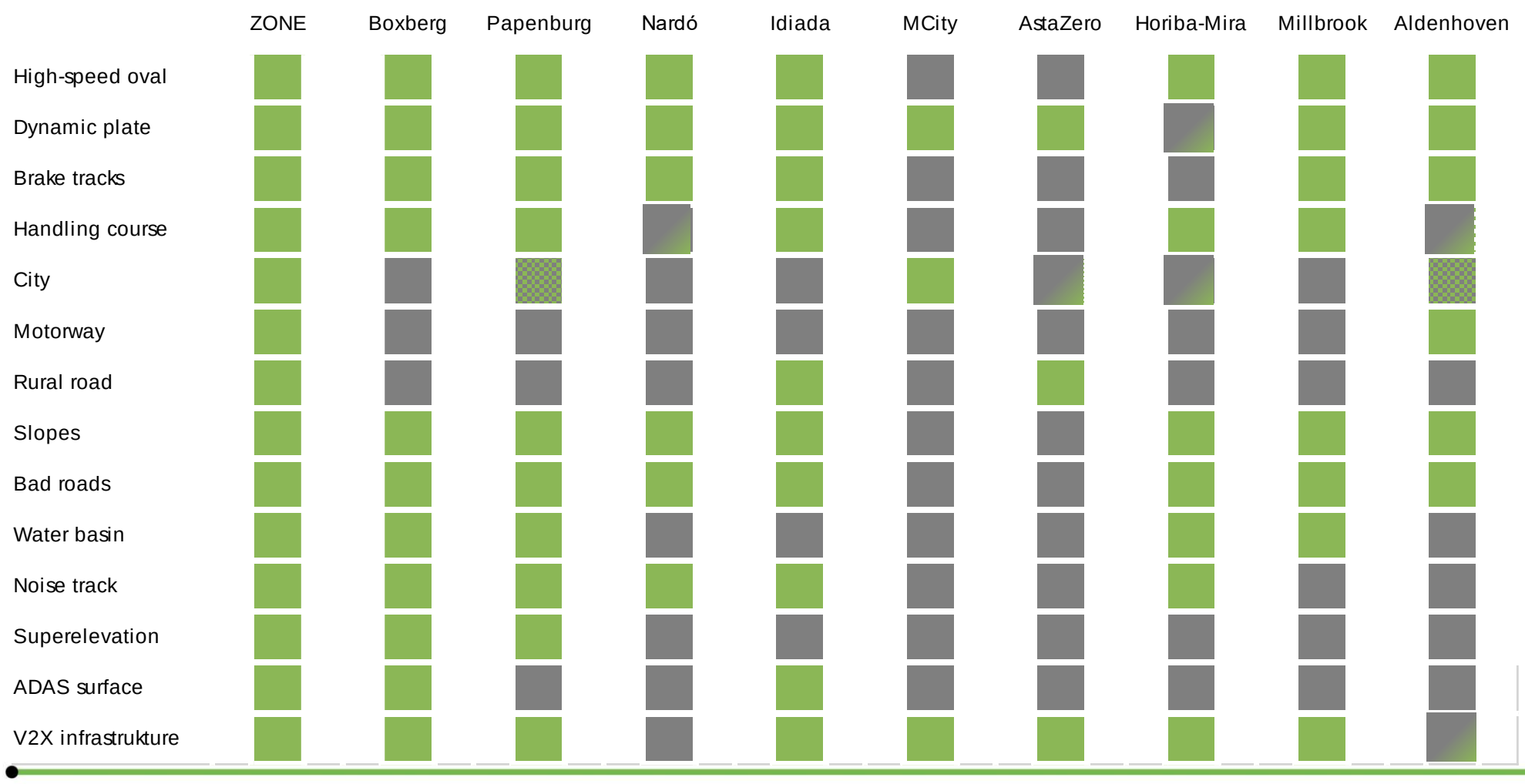
Benchmarks AD test environments:

- M-City (Michigan)
- Asta-Zero (Sweden)



Test track vision 2017

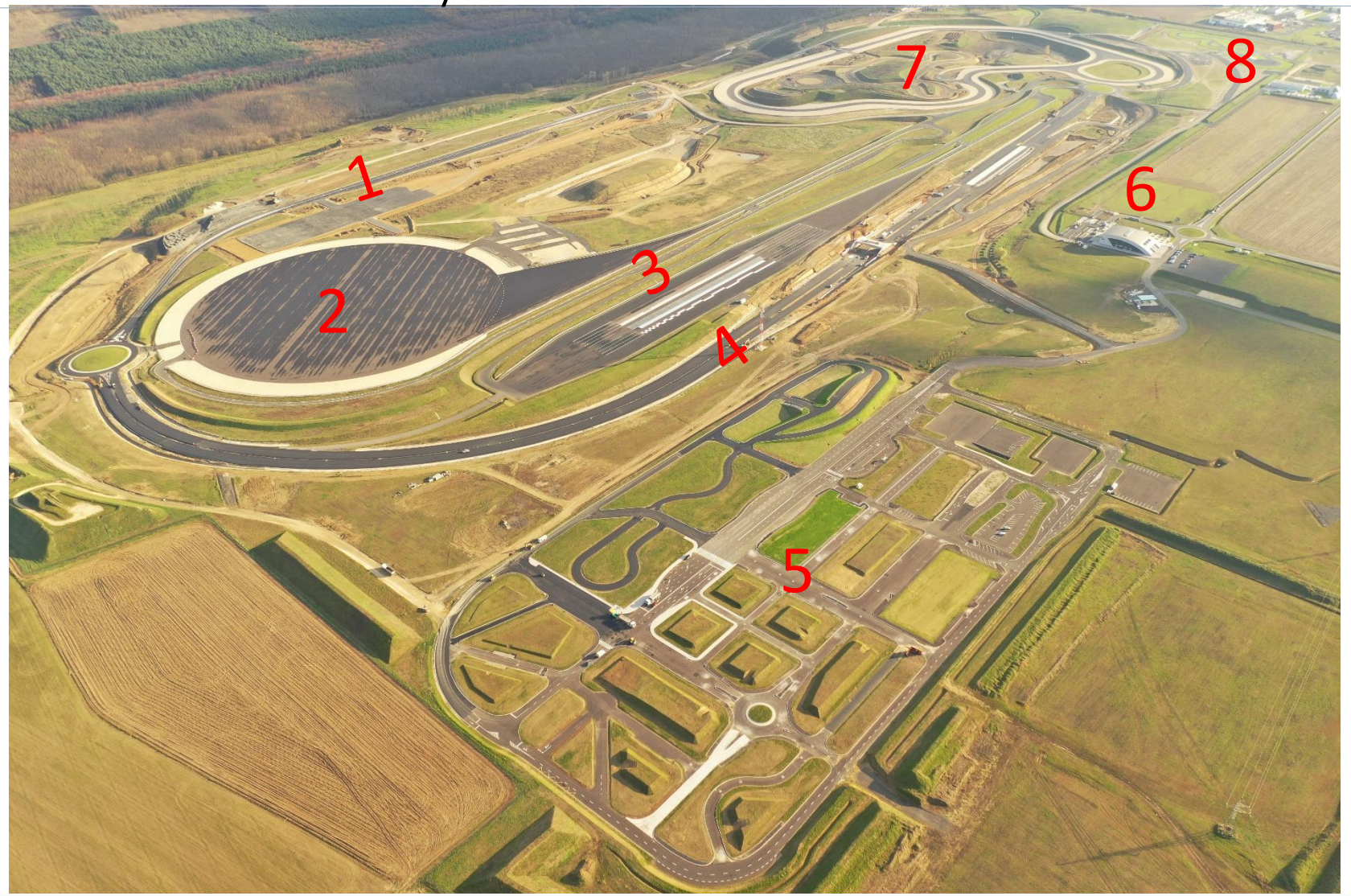
International benchmark tracks 2017



Test track vision 2017

Proving ground for dynamic vehicle tests and automated-connected mobility solutions

Test track status 2021 January



In use:

1. Rural road
2. Dynamic surface
3. Braking surface
4. Motorway
5. Smart city
6. Main building
7. Handling track
8. University track

zone

Project development

zone

Modules

Project timing

Phase 1: 2017-2019

Phase 2: 2019-2021

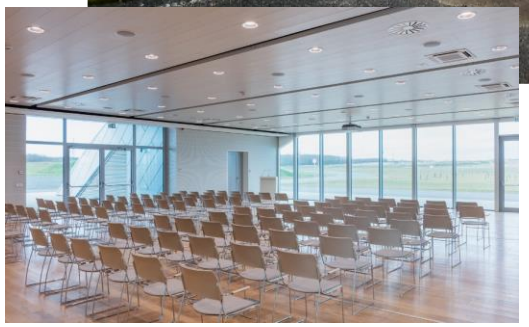
Phase 3: 2021-

Project development

Modules available

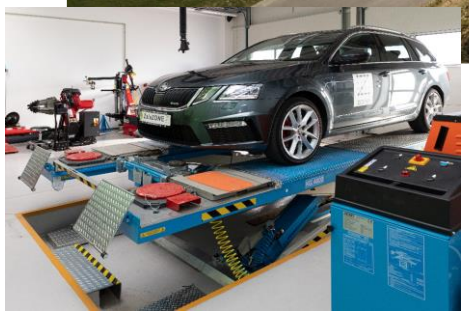
Buildings

Conference center



- Attractive conference rooms up to 300 people
- More than 500m2 exhibition surface (for cars as well)
- Catering

Technical building



- 8 double workshop/office units (110m2)
- 12 offices (25m2 each)
- Truck workshop 450m2

Modules available

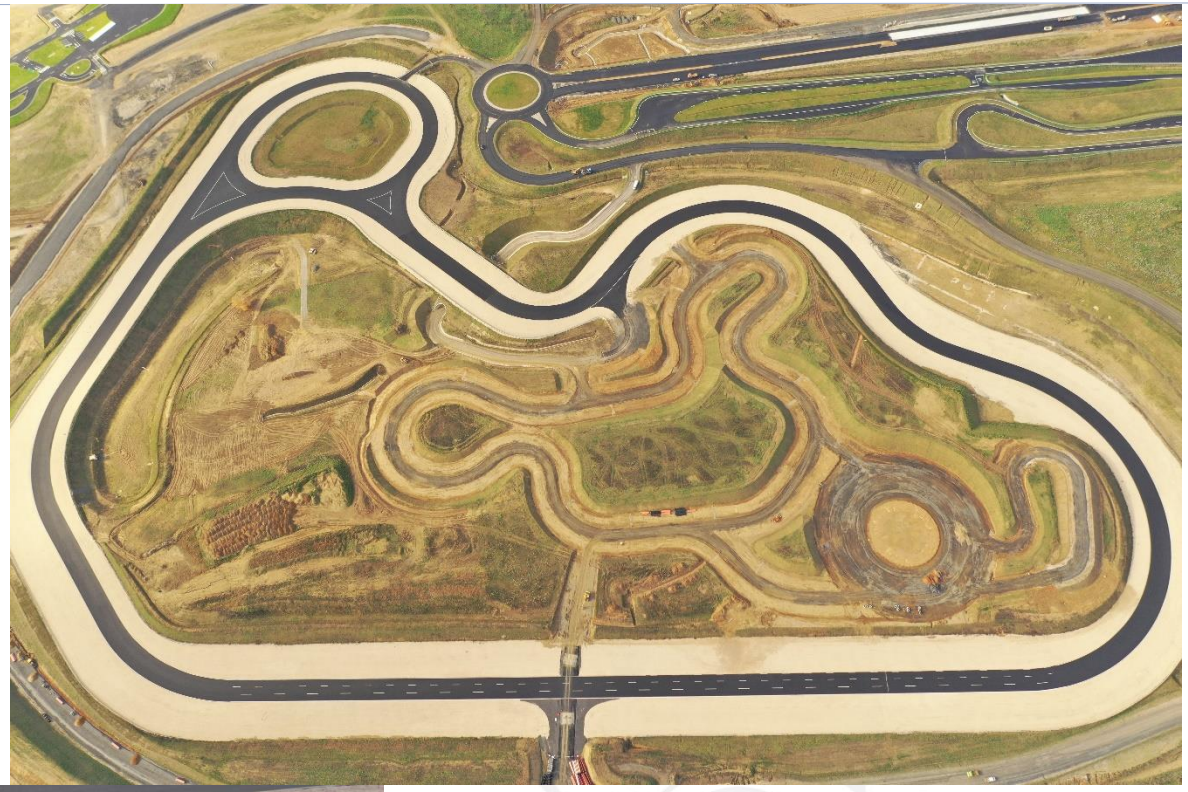
Dynamic platform

Parameters:

- 300m diameter asphalt surface
- Acceleration lane 760m
- 20m wide gravel run-off area with barrier
- 1% inclination to south
- Separated return way

Modules available

Handling course

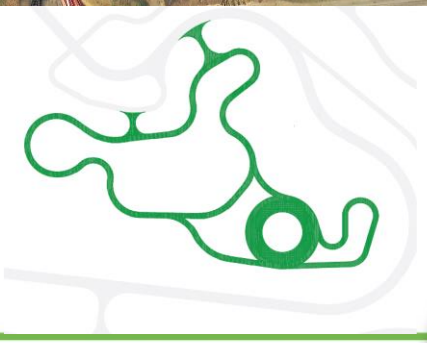


High speed handling available since 2019:

- ~120km/h average speed
- 2032m length
- Width: 12m
- Up to 20m wide gravel covered safety zones on both side
- Various topography

Wet handling (2021):

- ~60km/h planning speed
- 1.000m length
- Width: 6m
- Watering system along the whole length
- Grass covered safety zone
- Drift circle
- Various topography



Modules available

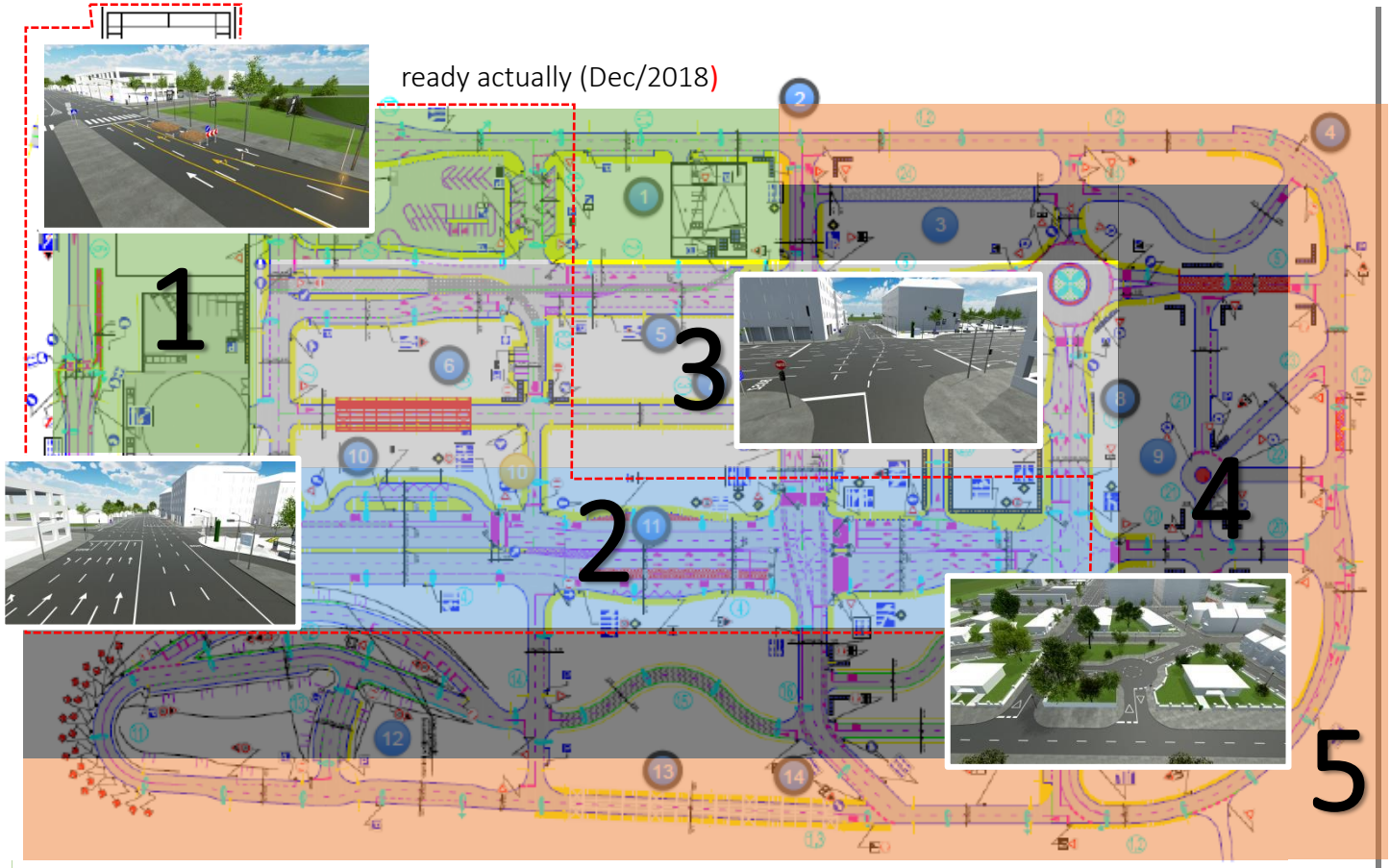
Smart city

Parameters:

- 500x300m (15ha)
- ~5km long overall street length
- Main street 400m, 2x3 lanes
- Low-mue crossing
- Hilly section
- Logistic yard
- Building fascades:
  - 600m long
  - Up to 10m height
  - Realistic construction
- Railway crossing, construction zone, pedestrian crossings, trees, moveable road signs, tunnel, roadside objects, various street lights etc.

Modules available

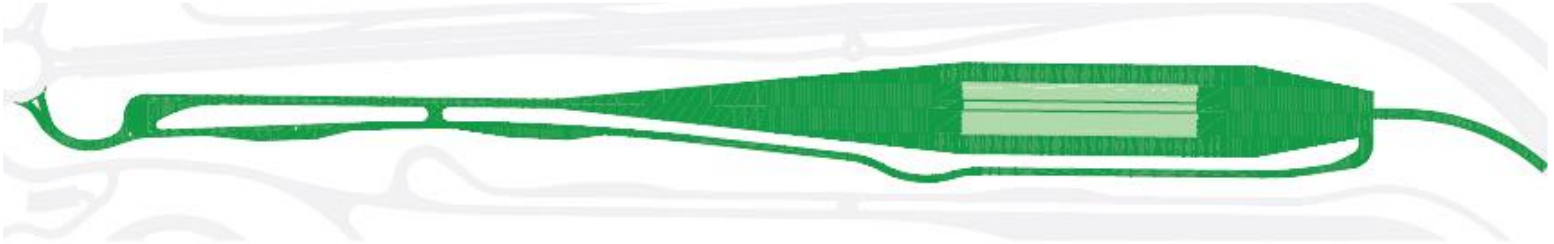
Smart city



1. Low-speed, parking area	2. Multi-lane high speed area	3. Downtown area	4. Suburban area	5. T-junction area

Modules available

Braking platform



Parameters:

- 8 different surfaces:
  - Chess surface: asphalt/tiles
  - Asphalt mue=~1 (optional watering)
  - Tiles mue=~0.1 (wet)
  - Basalt mue=~0.3 (wet)
  - Asphalt mue=~0.8 (optional watering)
  - Treated concrete mue=~0.6 (wet)
  - Asphalt mue=~0.8 (reserve surface)
  - Aquaplaning basin (max. 2cm wet depth)
- Surface width 4.5m except basalt where 8m
- 200m surface length
- 750m acceleration lane
- 16m safety area at both side, 150m at the end
- High-speed connection to motorway

Elements coming soon

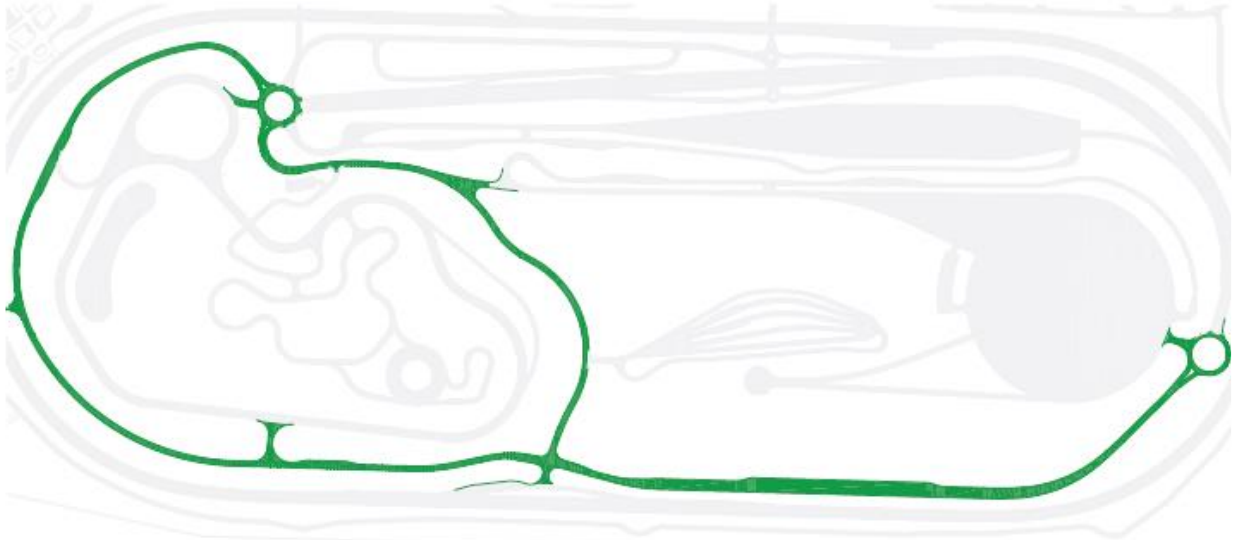
Motorway

Parameters:

- 1500m 2 x 2+1 lane motorway
- Public road like layout (junctions, road surface, geometry)
- 1 driving direction available now
- 2 different entrances and exits
- Motorway bridge (2021)
- Partly watered surface (2021)
- V2X communication coverage
- 100m tunnel simulation (phase3)

Elements coming soon

Rural roads



Parameters:

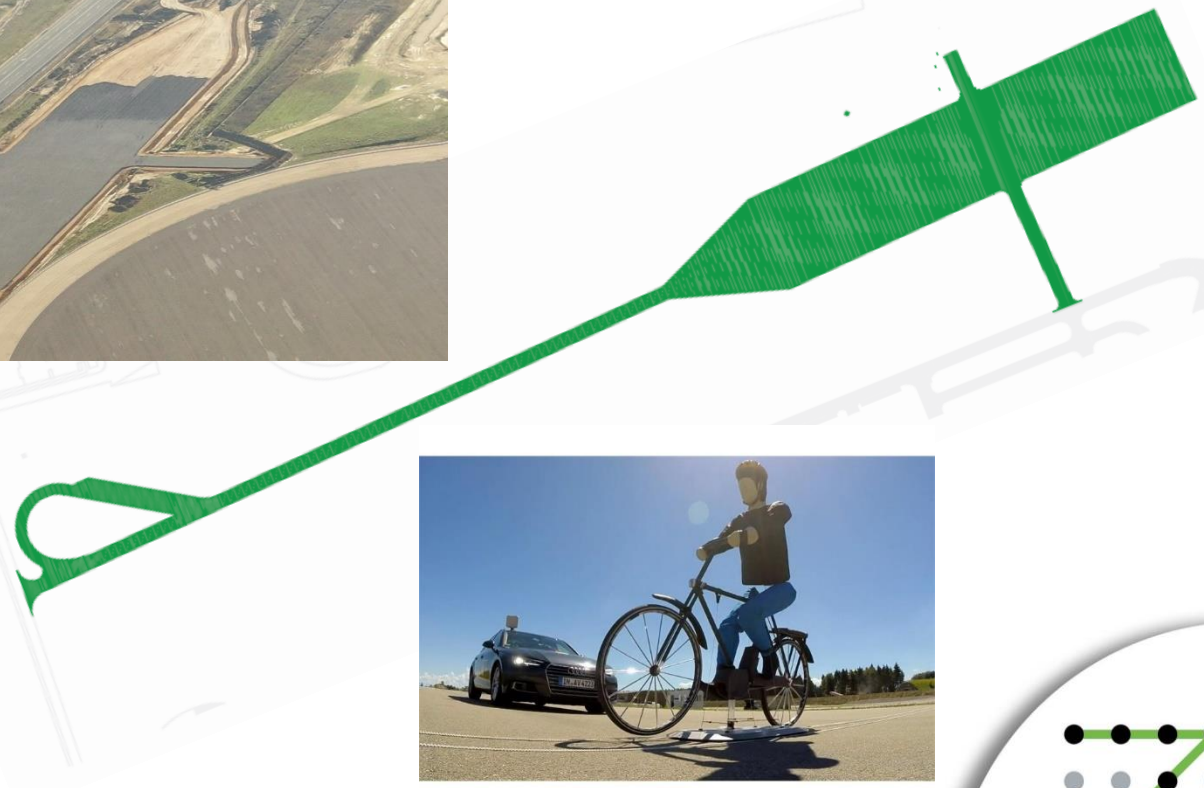
- 500m 2x2 lane motorway section (available)
- 2500m 2x1 lane rural road (1500m available)
- 2000m south section (2021)
- Changing topografy
- Public road like layout (junctions, road surface, geometry)
- 5G test network
- V2X communication coverage

Elements till 2021

ADAS surface

Parameters:

- New element reacting on the changing customer requirements
- Dedicated for ADAS tests with high preparation effort
- 750m overall length
- 500m long 8m wide acceleration lane
- Different roadmark setups
- Up to 130km/h
- Action surface 250x60m
- Crossroad for cross situation test

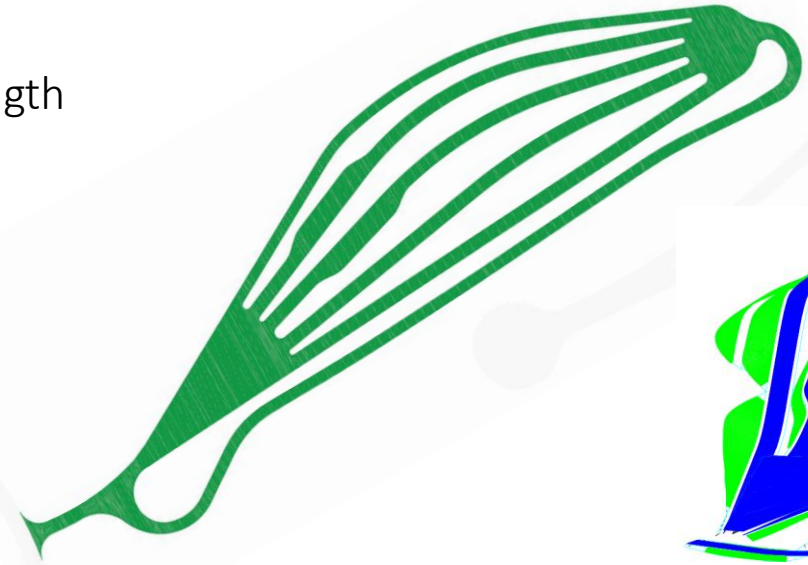


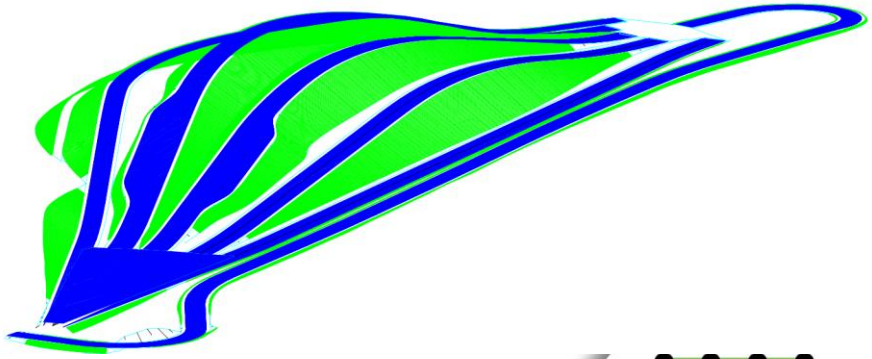
Elements till 2021

Traction control hills

Parameters:

- 62m (25%) up to 192m (5%) slope length
- 16m height
- 5 different slopes: 5%, 12%, 18%, 25%, 30%
- Low friction (5, 12, 18, 25%) surface, 25m length
- Separeted return lane
- Integrated watering system
- Safety zone and reinforced guard rail





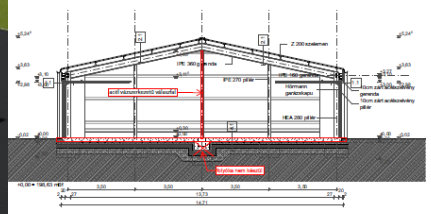
Elements till end 2021

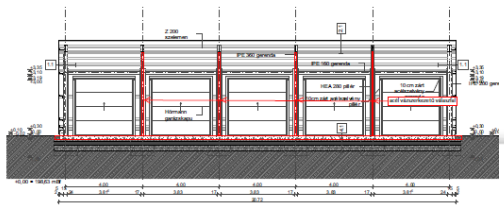
Buildings

Technical building extension (2021)

Petrol station (Opened 2020 November)

Prototype garage for 10 cars (2021 May)





Communication

Communication network

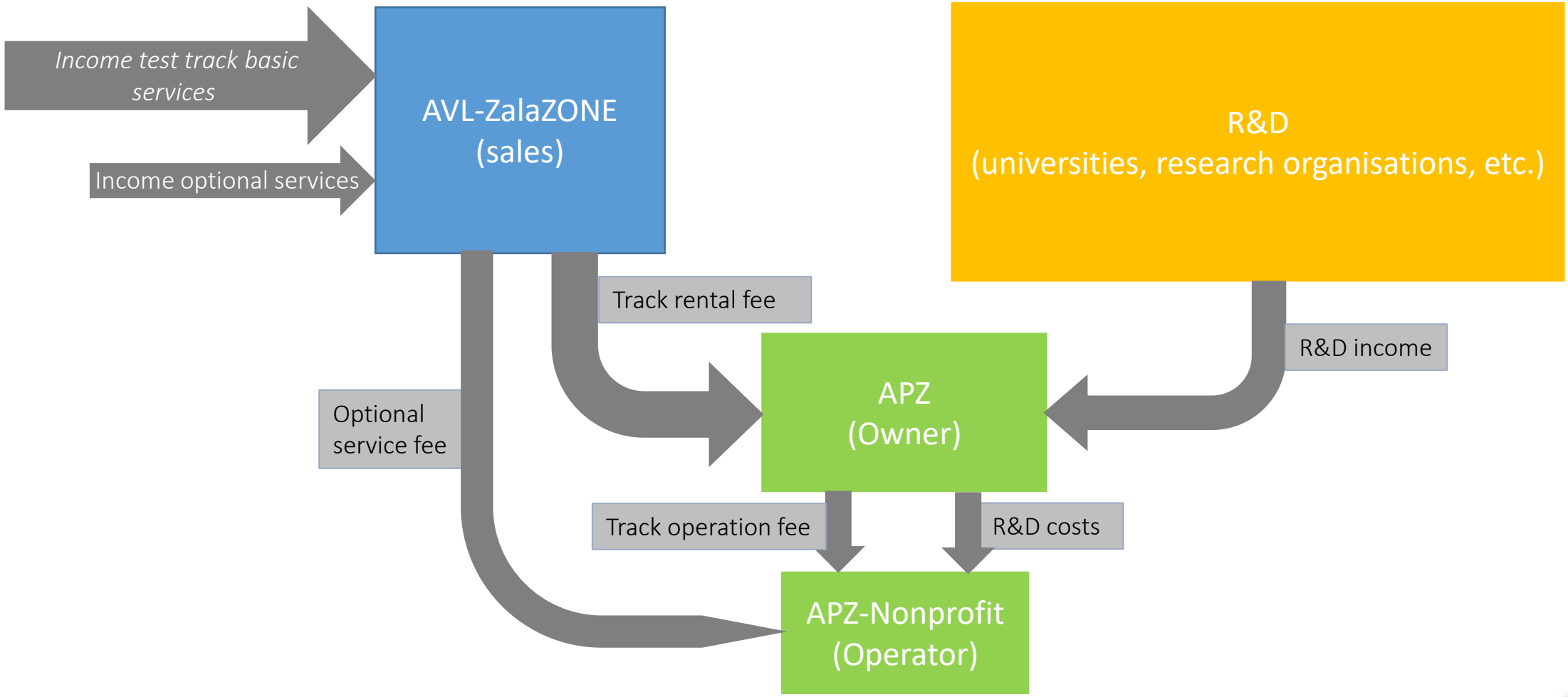
- Full coverage of test track (optinal)
- 5G cellular test network available for future ITS applications (T-System, Vodafone)
- ITS G5 V2X network:
  - 7 mobile RSU
  - Standard setup or
  - free configurable
- Redundant physical layout for parallel customer networks
- 5G campus network (2021)

Track Operation

Operation model - Processes

zone

Business model 2020

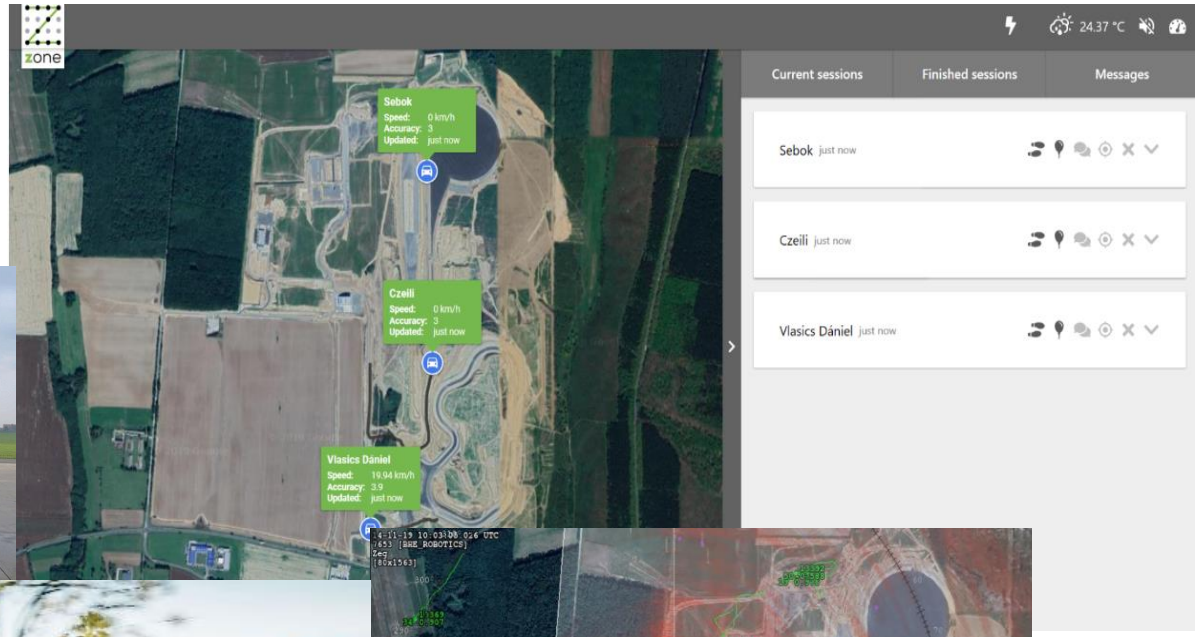


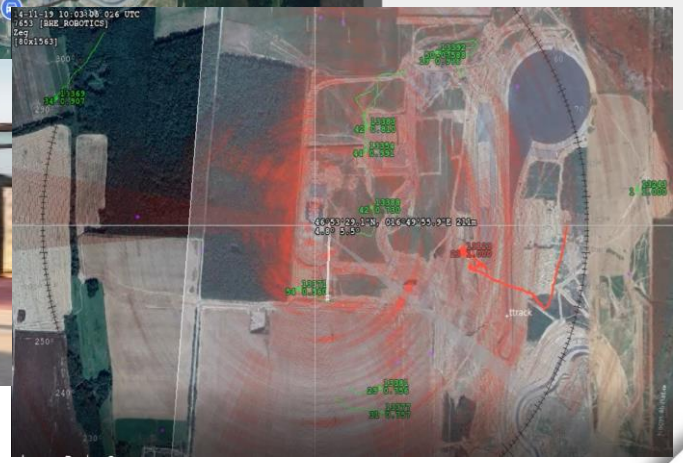
Cooperation regarding technical processes started in October with leading track operator ATP!

Operational processes

Main processes

- Risk management
- Real-time traffic tracking and control:
  - on-site
  - central
- Emergency services
- Track maintenance
- Facility management
- Security service
- Drone detection (pilot)





GOAL: Europian Proving Ground Safety Association (EPGSA) membership

Engineering services

From workshop to simulation

zone

Services available

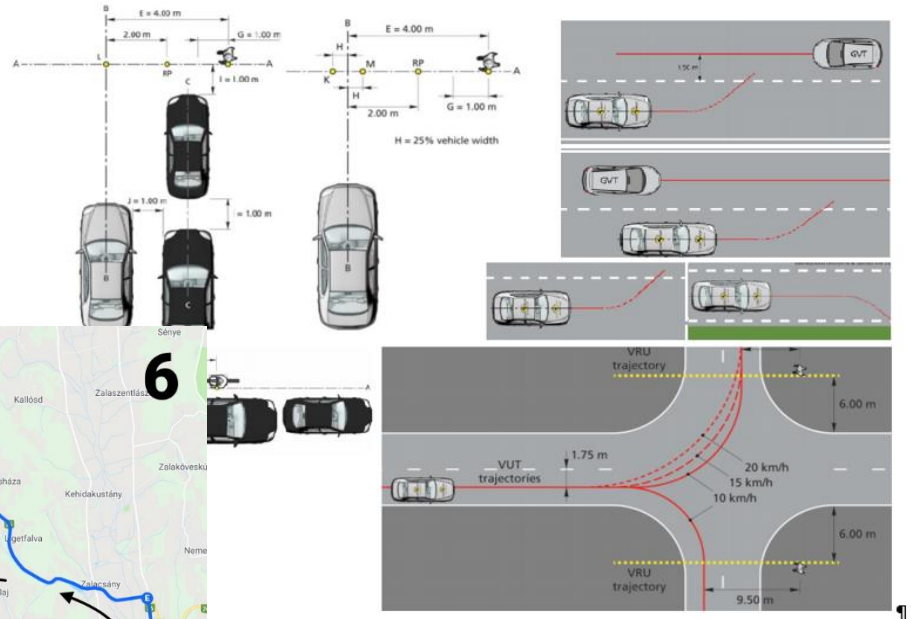
Workshop services

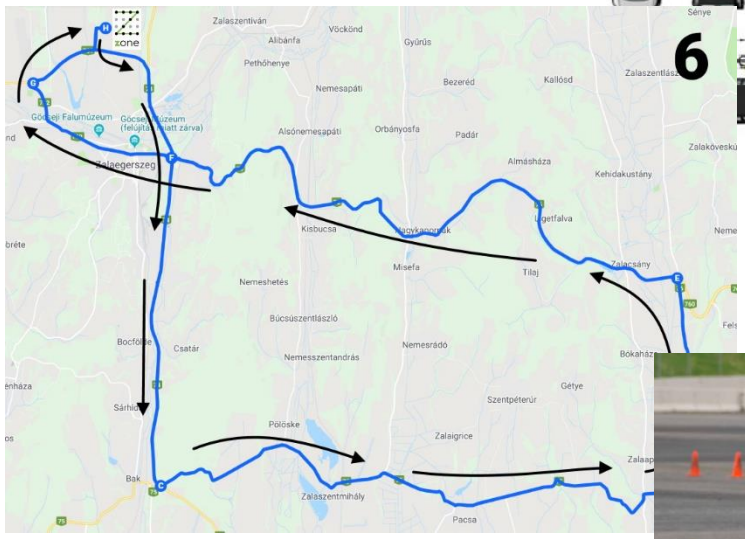
- General technician support with 2 technicians
- Standard workshop equipment available in all workshops
- Axle load measurement
- Tyre services (passenger car and truck)
- Suspension adjustment
- Roller bench for cars and trucks
- Cold chambers (optional)
- Standard chargers (5x22 kW)
- 150 kW charger
- 350 kW charger (2021)

Services

Engineering services

- NCAP testing with engineering support
- Test case development (manoeuvre catalog)
- Dynamic testing support
- Realization of customer test cases
- V2X support
- Support of public road tests
- General test engineering support

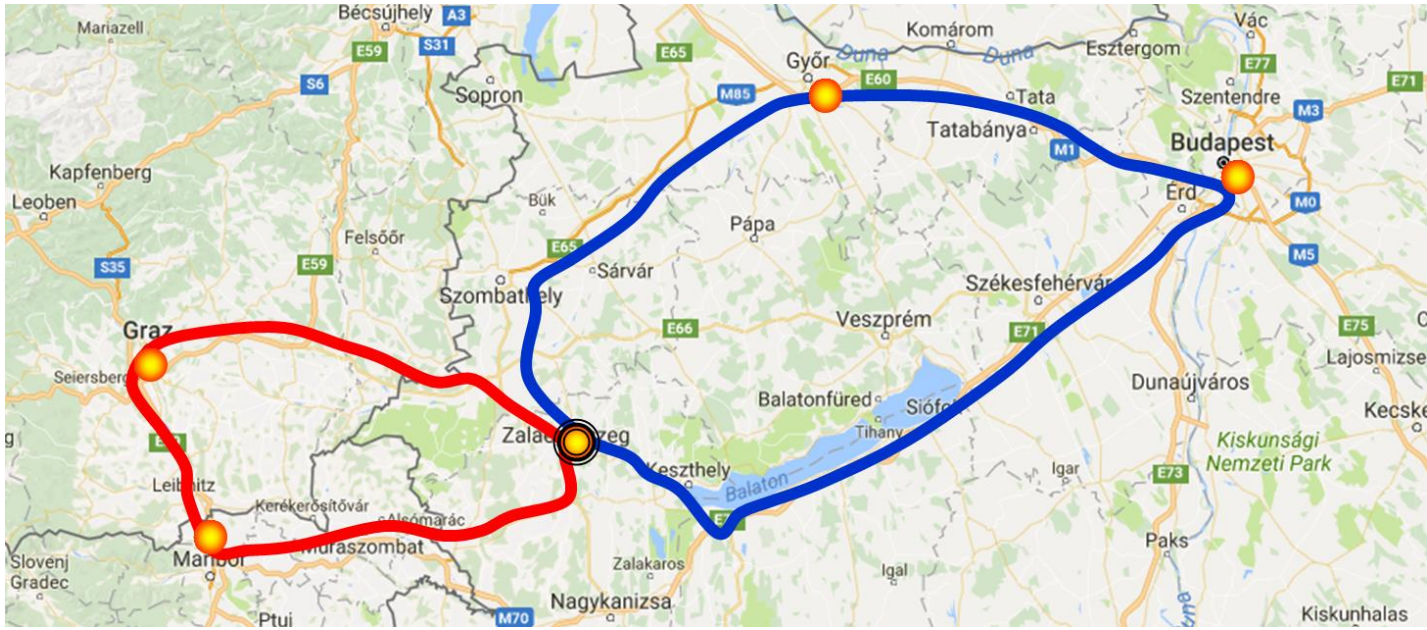




Services

Public road testing

- Valid since: 12.04.2017
- Product responsibility type regulation
- Regulation defined with industrial partners
- Limitations:
  - NO territorial
  - NO time limitation
- Two stage approval process:
  - Company, organization approval
  - Test drive registration
- Requirements:
  - Skilled, experienced driver in the vehicle
  - Independent logging system in vehicle
  - Pre-testing in closed environment



Loop_1: City local roads – smart infrastructure
Loop_2: Hungarian roads
Loop_3: International roads

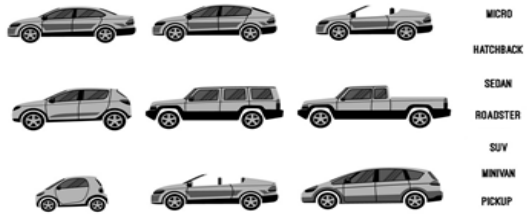
Services: available ADAS test equippement

Complex scenarios with fully syncronized elements

Targets

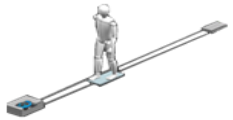
Pedestrian adult and child, Cyclist, PTW, Animal dummy

Dummy car: hatchback, sedan



20 real target vehicles

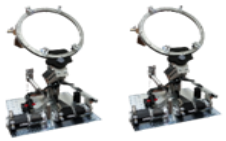
Carrier/actuators



Belt driven system

Small platform (UFO)

Large platform (UFO)



Driving robots (2 sets)

Drive-by - wire controlled real vehicle

Localization

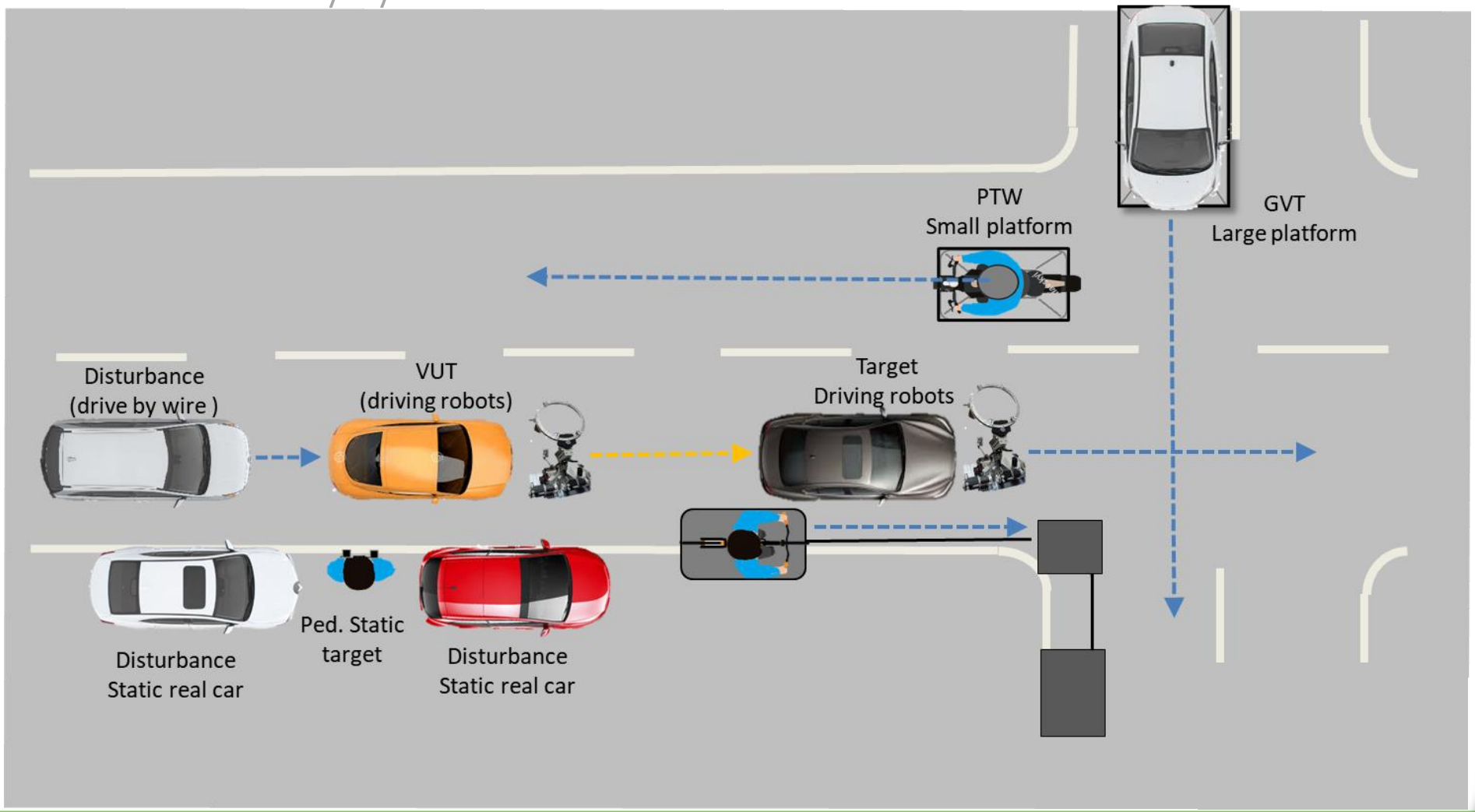
Localization Units (7 pcs)

dGPS Base-station

Path following, Synchron, control Simulation,

Services

Complex scenario with fully syncronized elements



ZalaZONE Research & Innovation

Cutting-edge Research

Future-proof Education

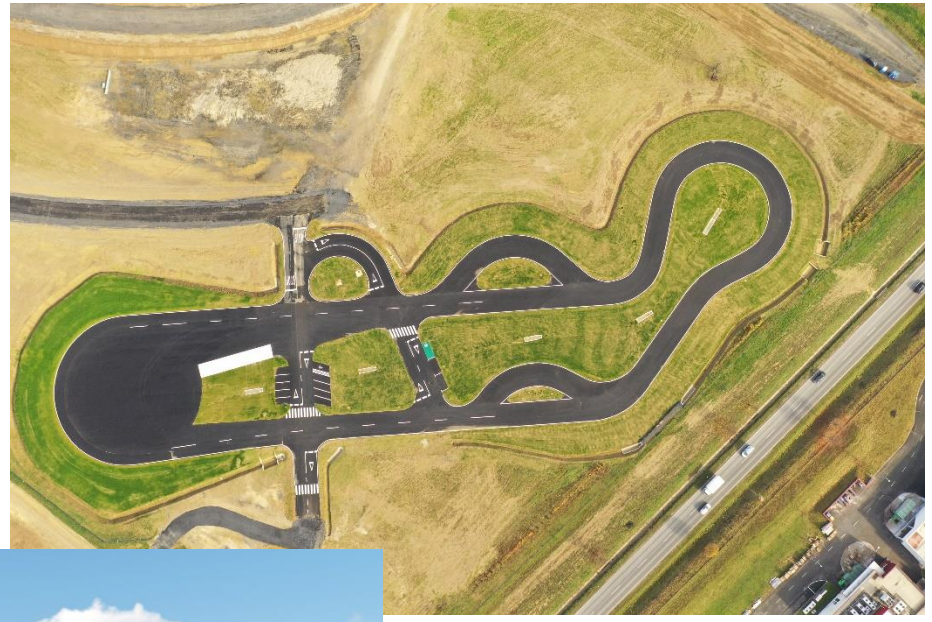
Wide dissemination of research results

Value-creating knowledge transfer

zone

Research and Innovation

University track and building



Track parameters:

- 800m overall length
- dynamic surface
- low-mue section
- different parking setups

Building (2021 autumn):

- auditorium for 100 people
- offices for 20 people
- direct connection to external campus

zone

Research and Innovation

ZalaZONE Research & Technology Center

- University research groups
- Dual-education programs
- Industrial laboratories
- Start-up incubation

Research and Innovation

New age of education: from lectures to mentoring

Autonomous Vehicle Control Engineer
M.Sc. in English

Computer Science for Autonomous Systems
M.Sc. in English

Vehicle Test Engineer
BProf in Hungarian

zone

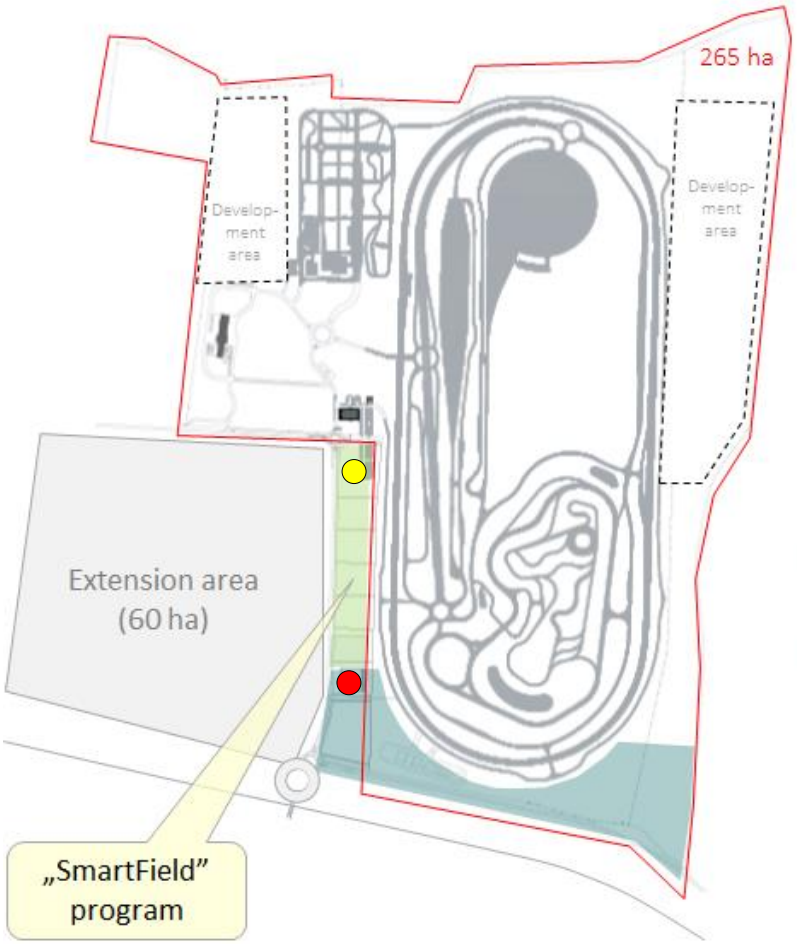
Research and Innovation

ZalaZONE Joint Research Projects – Industrial and Scientific Partners

zone

Research and Innovation

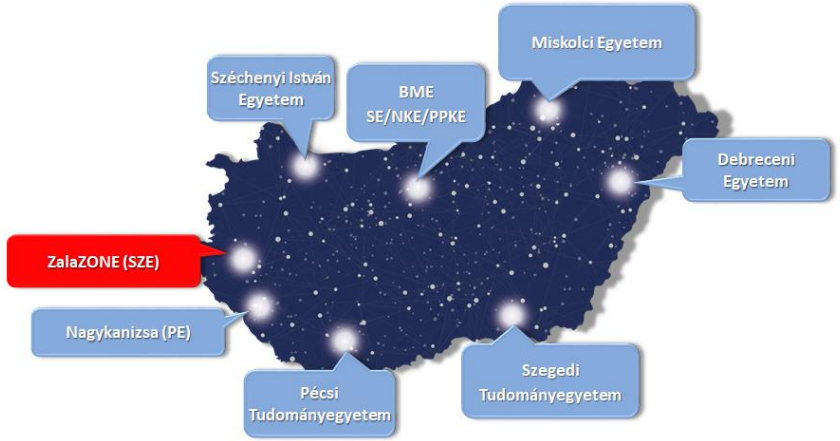
ZalaZONE Science Park progress



AVL

PG customer zone

R&D&I campus



Hungarian Science Park Program locations

- ❑ University local teams
- ❑ SME’s
- ❑ R&D projects
- ❑ Industrial (technical) service
- ❑ Laboratories
- ❑ ZalaZONE trainee program

ZALAZONE - Region Zala