

# VDV-Symposium zum autonomen Fahren

Commuter traffic: VDL Bus - Enabling the future of mobility

Menno Kleingeld | 28 Aug 2020



# Facts & figures VDL Groep

31 december 2019

**104 COMPANIES**



SPREAD ACROSS  
**20 COUNTRIES**

**TURNOVER**  
€ 5,8 BILLION

**PROFIT**  
€ 156 MILLION



**15.748 EMPLOYEES**

**83% EXPORT**  
TO **111 COUNTRIES**



COMPANY ACTIVITIES  
DIVIDED ACROSS **4 DIVISIONS**

**STRONG** BALANCE SHEET POSITION  
SOLVENCY **64%**



**1.425.000 M<sup>2</sup>**  
PRODUCTION SURFACE AREA

# Highlights VDL Groep



# 4 Simultaneous trends

Electric, Connected, Autonomous, Shared/Services



# Development philosophy: modular design, fast innovation

## Platforms and building blocks

- Fundamental belief that there are 5 important vehicle PLATFORMS for our business:
  - Coach platform
  - PT platform
  - Van platform
  - Truck platform
  - AGV platform
- These vehicle PLATFORMS will have to share as many BUILDING BLOCKS as possible to get speed in development and economies of scale
- PLATFORMS and BUILDING BLOCKS are roadmap driven, preferably by the market



# Frontrunner European electric Heavy-Duty transport market

Profound in-house application knowledge of e-mobility solutions

- Pragmatic approach fueled by rich application knowledge in Heavy Duty e-mobility for >15 years (hybrid / full electric / hydrogen)
- Long lasting knowledge in autonomous driving (including safety certification for road release) present in team, as well as specialist knowledge on e-mobility building blocks
- Technology independent system integrator, working with leading automotive suppliers (ZF, Wabco, Siemens, Continental, DAF) as well as working with leading OEMs and upcoming start-ups
- Strength in quickly coming up with new concepts (working prototypes) until realization in series manufacturing
- The ability to use the same technologies over multiple platforms





# ELECTRIC

> 50,000,000 km

> 130,000 km/day

# AUTONOMOUS

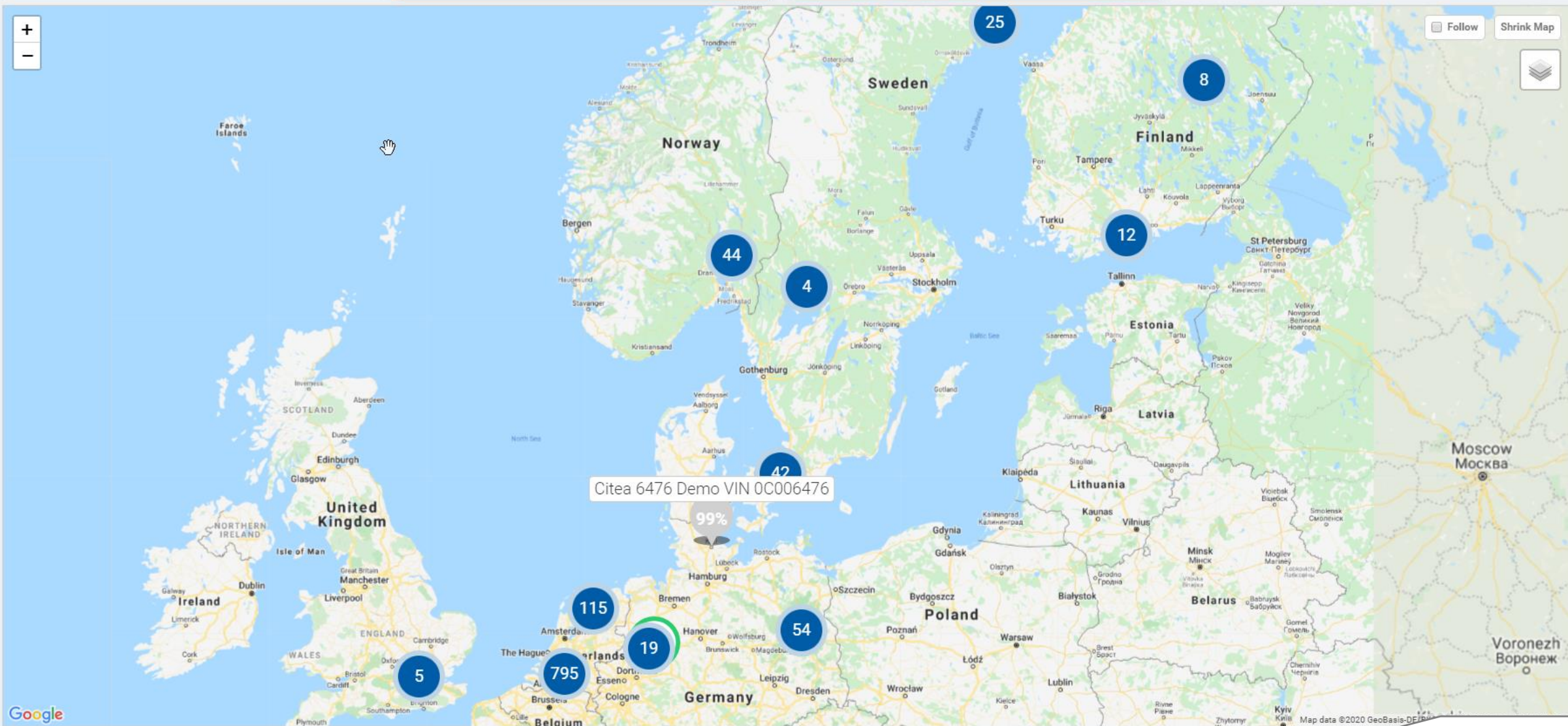
> 2,000,000 hours

> 685 hours/day

189 752 km  
Driven distance  
940

453/1225 (37%)  
Active vehicles

129 Vehicles  
charging



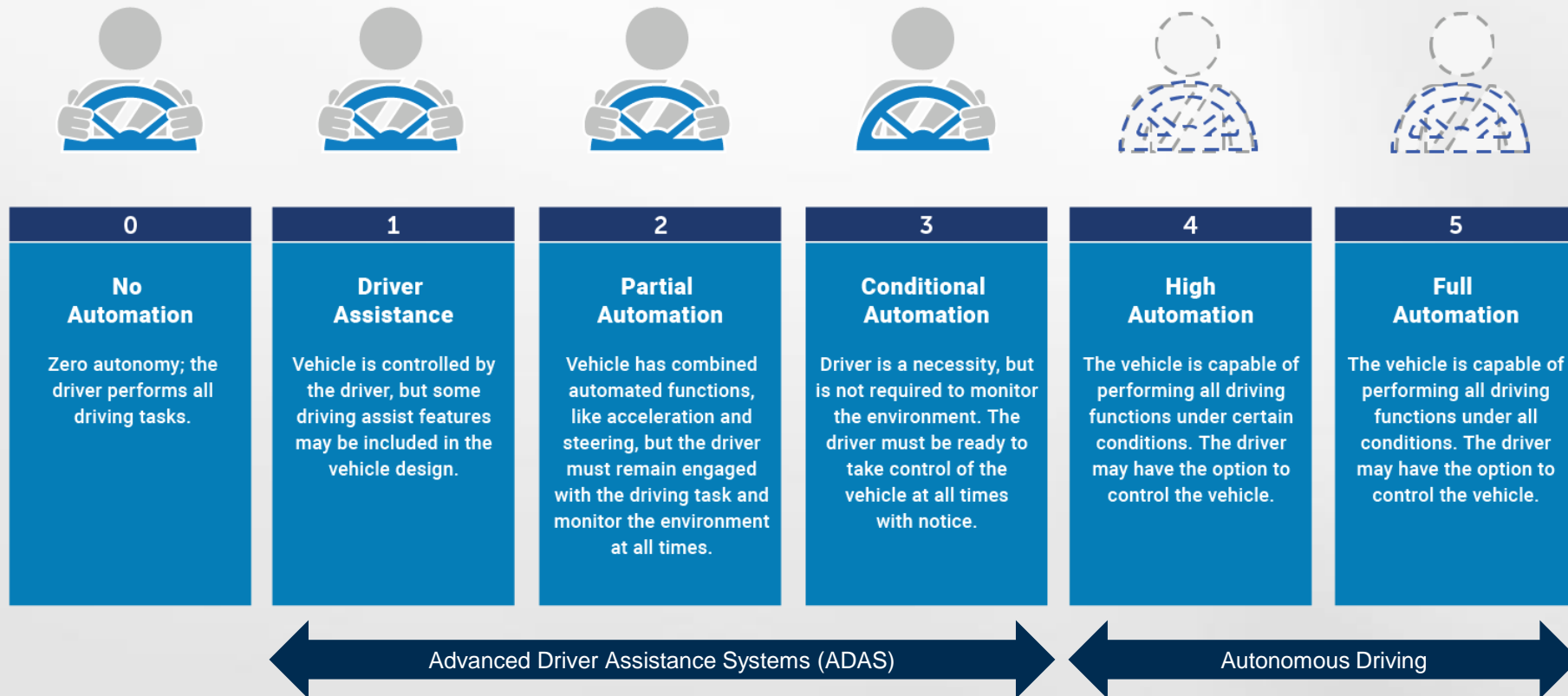


# Autonomous Driving

The definition of autonomous driving

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE) AUTOMATION LEVELS

Full Automation



**SAE'S J3016** PROVIDES A COMMON **TAXONOMY AND DEFINITIONS FOR AUTOMATED DRIVING**, AMONGST WHICH SIX LEVELS OF DRIVING AUTOMATION.

# Autonomous Driving

## Safety

THERE ARE **4 PARAMETERS** WHICH CAN BE USED TO **GUARANTEE** A **SAFE AUTONOMOUS DRIVING SYSTEM**.

### **DRIVER**

THE VEHICLE HAS A DRIVER WHICH IS ABLE TO TAKE OVER THE CONTROLS OF THE VEHICLE AT ANY MOMENT IN TIME



### **SPEED**

THE SPEED WITH WHICH THE VEHICLE IS TRAVELLING IS LIMITED



### **CERTIFICATION**

THE SYSTEMS WHICH CONTROL THE VEHICLE ARE CERTIFIED FOR THIS PURPOSE



### **OTHER TRAFFIC**

THE VEHICLE RUNS IN AN AREA WHERE THERE IS NO INTERACTION WITH OTHER TRAFFIC



# Autonomous Driving

The first steps for VDL

## 1999

- APTS starts with the development of their own autonomous driving system
- Complete in-house development

## 2002

- First APTS Phileas with an automated driving system is produced
- Positioning based on magnets in road surface



# Autonomous Driving

## New Challenges

### 2002-2009

- Multiple meetings with (inter)national government bodies to get the legislation needed for autonomous buses in place

### 2010

- The first of 85 AGVs is delivered to the port of Rotterdam
- Same technology as the APTS Phileas

Level  
**2**



# Autonomous Driving

Next Gen AGV

Level

4



2017

- Driverless in a manned environment with up to 78 tonnes of cargo
- Nominated for the Automotive Innovation Award 2017

# Autonomous Driving

EMDAS Project

Level

4



2017

- EMDAS Project
- Fully autonomous vehicle for testing and validation purposes

# Autonomous Driving

PSA Singapore Project

Level

2

2020

- First deliveries of the largest fleet worldwide of automated vehicles in Singapore

# Autonomous Driving

AUTODEPOT Project

2020

- AUTODEPOT
- Testing of Automotive grade 3D Solid State Lidars and SLAM algorithms
- Testing and validation of autonomous bus depot concepts





# Autonomous Driving

Ambitions

## NEAR FUTURE

AEBS, LINE ASSIST AND SIMILAR  
DRIVER-AIDED SYSTEMS

## SHORT TO MIDTERM

AUTOMATING SEMI-CLOSED ROAD  
AND/OR DEPOT OPERATIONS

## LONG TERM

DRIVERLESS PT BUSES IN A CITY  
ENVIRONMENT, LEVEL 4 AUTOMATION

INTRODUCTION SPEED DEPENDENT ON  
**MARKET-ACCEPTANCE** AND  
AVAILABILITY OF REQUIRED **LEGISLATION**

# Concluding summary

Does that mean VDL is ready for autonomous commutes?

- VDL is an experienced player in commercially deployed (electric) buses and AGVs
- VDL uses modular innovation philosophy, combining experience and strengths in various application areas
- Increasing need to aid drivers (finding them...) and autonomy;
  - Technology offers possibilities
  - Commercially it needs to make sense
  - Legislation and certification for truly safe system are the real hurdles
- Besides developing a vehicle, the 'super-system' needs to be ready as well
- Good technical solutions underway – integration is the keyword!
- Road doesn't get shorter by not moving – building experience now



Thanks for your attention

