



# Systematic on-site reviews of autonomous vehicles

Virtual Meeting – 16<sup>th</sup>, September 2020

A presentation for



# The h&z Center for Future Mobility (CFM) is an in-house knowledge hub working on four core topics in close cooperation with various clients

## Introduction of h&z Center for Future Mobility



### Autonomous driving/ ADAS

- Key developers
- Software stacks
- Technical performance
- Operations
- Test projects
- ...

### Autonomous Driving



### Mobility Solutions



### Mobility solutions

- ODM Mobility
- Multimodality
- VTOL
- First and last mile
- Micromobility
- ...

### Connected vehicles

- Applications
- Legislation
- Data Privacy
- 5G
- Infrastructure
- ...



### Connected Vehicles



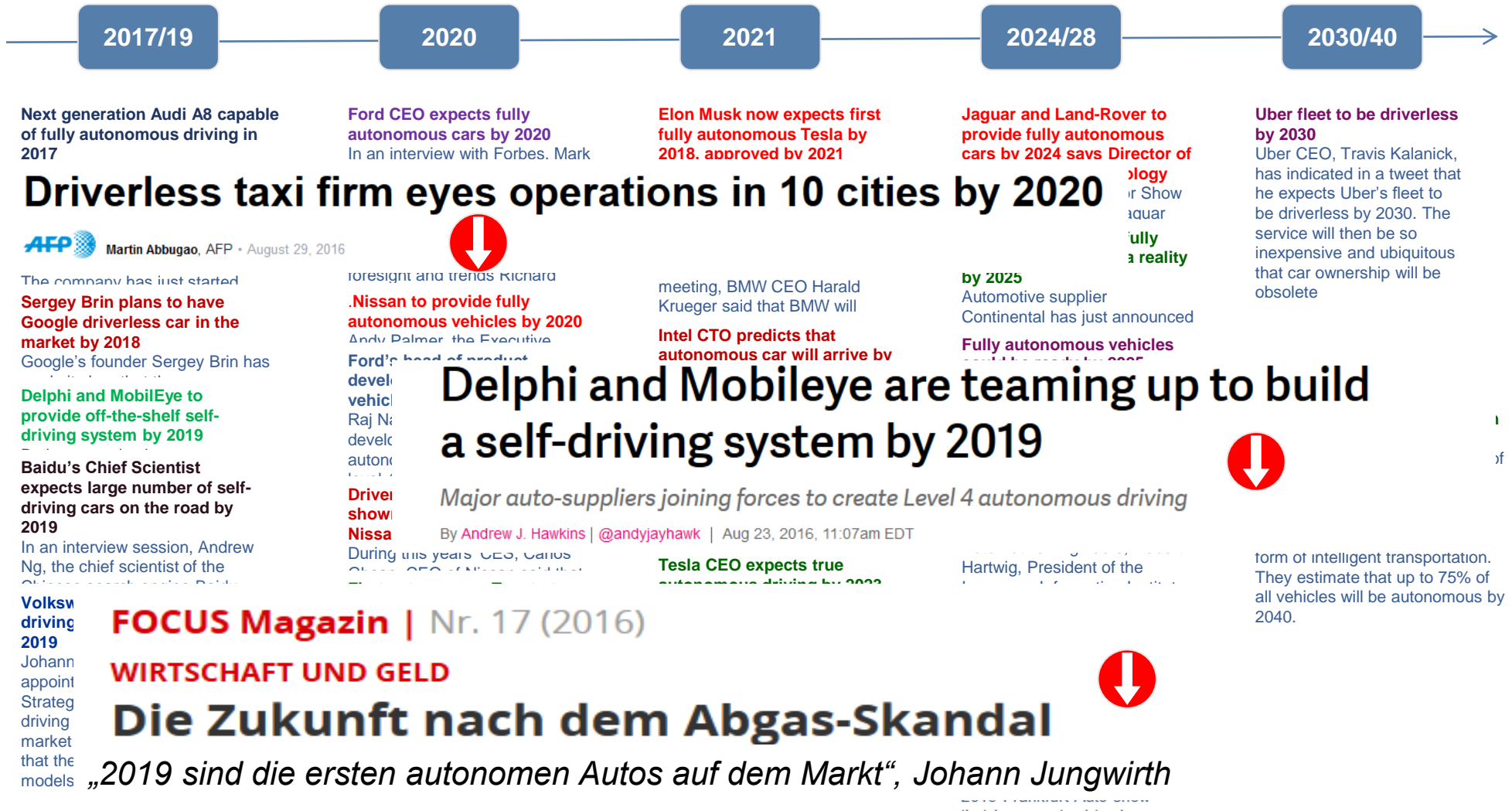
### Alternative Fuels

### Alternative fuels

- Batteries
- xEVs
- Hydrogen production
- Charging infrast
- ...

Especially in AD we have witnessed stark discrepancy between promises and reality, however traditional ways of *understanding* only got us to a certain point...

Empty promises in AD



# On-site observations are critical to fully understand the status quo with regards to vehicle performance, operational setup and developed business models

Exemplary observation area in California and Phoenix

## Bay Area



DAIMLER



## On-site Details

- Multiple times per year, we visit the testing hotspots of the world
- Until today, we have collected more than **12 hours of structured and prepared 10-15 seconds clips**
- These videos serve for a systematic review of the status quo and the implications of AD



## Los Angeles



## Phoenix



Media and PR only tell a skewed story. In order to see how far autonomous driving **really** is, one must be on-site and understand what is going on

# During the on-sites we have gathered enormous amounts of data on a very detailed level that is helpful to various project partners

## On-site observations – selected outputs

The depot is located in West Chandler (Arizona) next to the highway and main boulevard; The building is not fenced but remote enough to be overlooked

The company's main operation

The depot

- Completely surrounded by parking lots with no visible entrance
- We assume an Arva and FCA maintenance team is permanently on site in the yard area
- Building (12,730m²) + parking space (15,762m²) + Depot (28,512m²)

7299-7515 E Fairview St  
Chandler, Arizona  
USA

Accessible location

- The depot is located approximately 2 minutes from the main boulevard in Chandler connecting the city to neighboring areas
- In addition, the highway is no more than 5 minutes away
- Both existing streets are dead-ends leading for virtually no bypassing traffic

New arrivals

- Around 10 new vehicles were parked inside the depot
- LIJAR was covered up with white caps
- Could indicate lack of space inside the depot

1) The depot is perfectly located to quietly access a variety of testing areas

Complex maintenance servicing seems to take place at an AutoNation location; This process seems tedious due to long downtime and vehicle tech exposure

Transportation for complex maintenance tasks

Maintenance transportation route: throughout Phoenix

Comments

Observation

- The vehicle is picked up by an FCA, the vehicle and placed in a company's representative
- The vehicle is brought to an FCA maintenance shop on the premises of an authorized dealership
- At the garage, the car is offloaded and waiting for maintenance
- There is no indication that it receives priority service or that it is being screened of for general public and other employees

Maintenance operations

- The maintenance operations seem peculiar and not efficient at this time
- Transporting one vehicle at a time through Phoenix for specific maintenance tasks (vehicle was still operations) does not seem economically viable

## Location(s) & Operations

In previous projects, we have provided a detailed overview of the scale of operations and the efficiency level of testing efforts incl. indication of fleet utilizations

Thanks to close observations, we developed an indicative view of the central display central to AD functions

Self-driving display (indicative)

- This green semi-frame only flashes when the sun indicator is set
- This large green spot is only active when the car is free to move (also without a traffic light routine)
- Blue boxes dynamically display all moving objects detected in the vicinity
- A blue line indicates the intended path

\*The self-driving display is mounted to the wind shield

Approaching ambulance: The vehicle decreases speed and stops on the outer right side of the right lane, coming to a complete halt and holding up traffic

Approaching ambulance

Description and performance

Situation

- Traffic intensity: Medium
- Road conditions: Very good
- Location and direction: Chandler Blvd - direction west
- Vehicle ID: Observation\_3\_Subject\_2 (see also above on slide 20)

Description of situation

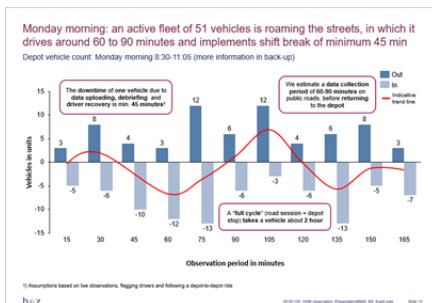
- The vehicle drives on the right lane
- Ambulance is approaching steadily and can be heard on the left lane which is clear of traffic; other vehicles continue in their respective lanes (middle or right) at normal speed
- The vehicle comes to a complete stop on the far right and activates emergency blinkers
- Several other vehicles are blocked behind the stopped vehicle which waits for 4 seconds until continuing (probably decongested)

Performance assessment

- Vehicle's behavioral pattern is based on algorithmic response (if ambulance jamp if on the right lane) then stop on the side
- In this case, the behavior was inappropriate; other drivers were caught off-guard potentially causing a dangerous situation

## Technical assessment & driving behavior

During our many observations of autonomous vehicles on the road, we collect ample data on how the system behaves in real-life traffic situations and the overall technical set-up is performing



Context

- The map shows current development; Chandler and marks all relevant spots in the city where the company is active
- The depiction on the right side shows the main pick-up and drop-off points which were highly marked in the news to increase mobility
- Examplifying vehicle sub-routes

Pick-up and drop-off points in Chandler

- Waypoint
- Waypoint
- Chandler shopping mall
- Test campus
- Observed info with passenger

## Routes, testing area & scale

Given our several weeks in the testing area, we are able to provide estimations on where the autonomous vehicles go, what area they span and what potential customer value they can create

h&z



Center for  
Future Mobility

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**h&z** The consultancy with  
Head, Heart & Hand

The Transformation Alliance The logo for The Transformation Alliance features the text "The Transformation Alliance" in a sans-serif font, followed by a stylized graphic element consisting of two overlapping, curved shapes that resemble a wave or a ribbon.