ECSEL Joint Undertaking
Electronic Components and Systems for European Leadership

Bundesministerium für Bildung und Forschung

# AutoDrive

Advancing fail-aware, fail-safe, and fail-operational electronic components, systems, and architectures for fully automated driving to make future mobility safer, affordable, and end-user acceptable


AutoDrive


# Overview Presentation Automotive Torino

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18. November 2020

# Together we build better . … Mobility.E ECSEL

MOBILITY>E LIGHTHOUSE

Home

THE COLLABORATION-NETWORK-PLATFORM

**Together we build better.**

CRITICAL MASS Safety MOBILITY STANDARDS

DeCarbonisation & MISSION ZERO

MOBILITY AS A SERVICE

5000KM

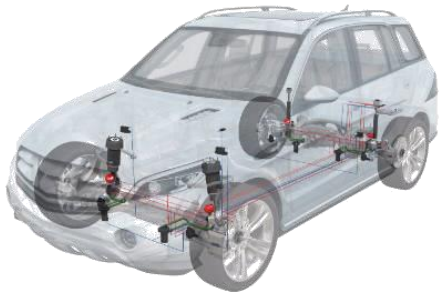
Shuttle


E2

UAV (Unmanned Aerial vehicle)

300 V
6x 13.5 kW
40 h, 5400 km

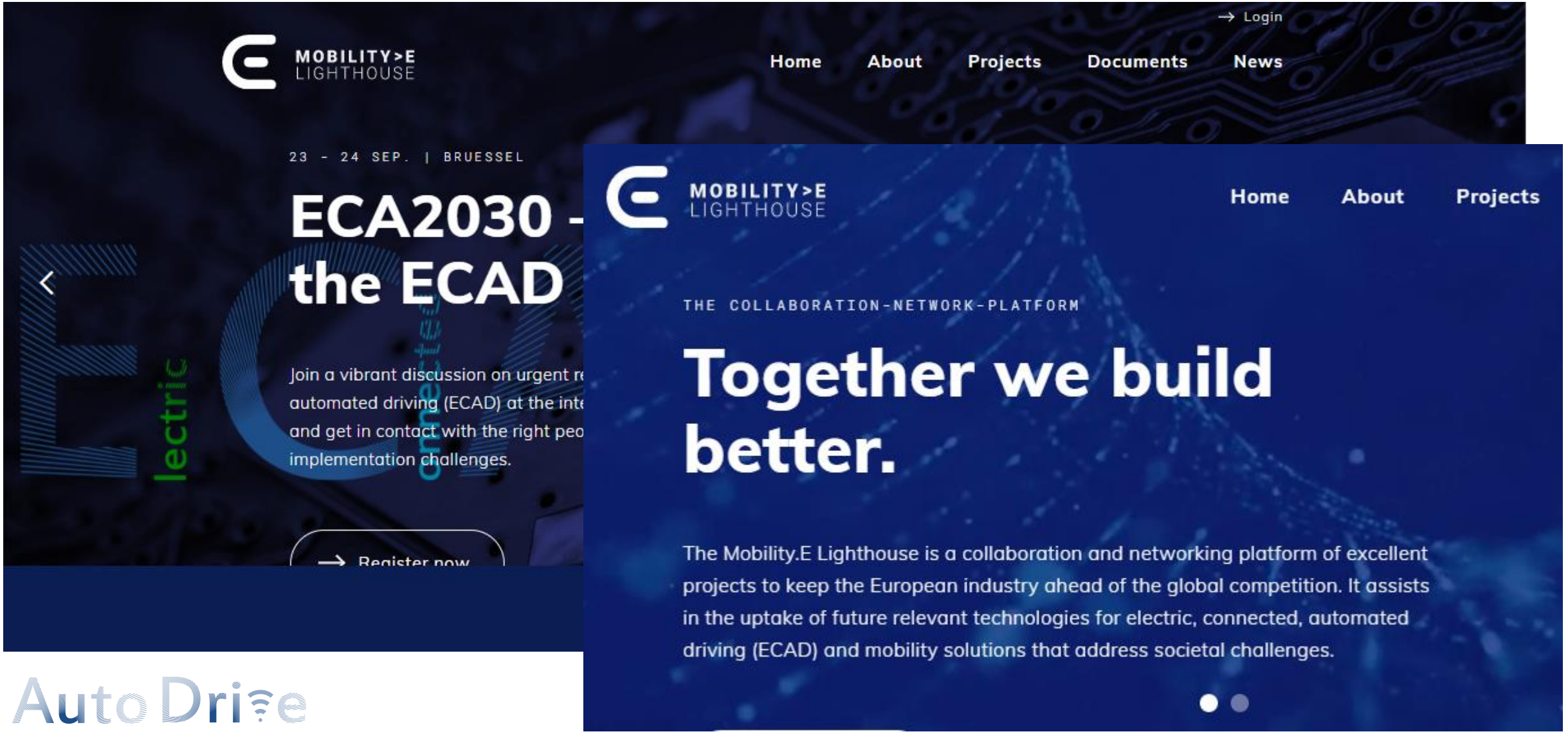
AutoDrive
Fail-operational ,
Fail-aware



Fail-operational and + 11-13% efficiency

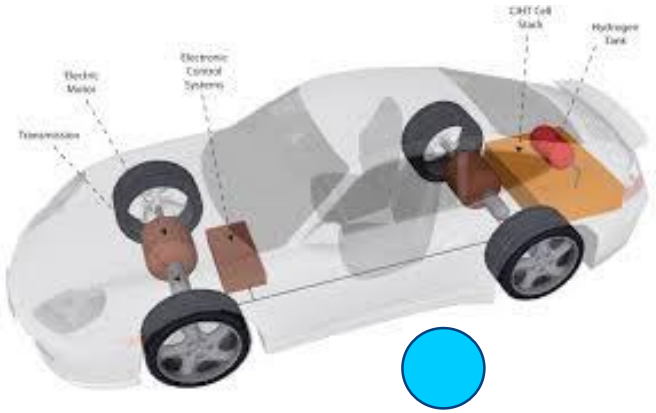
BUS

# Mobility.E (E -> ECSEL)

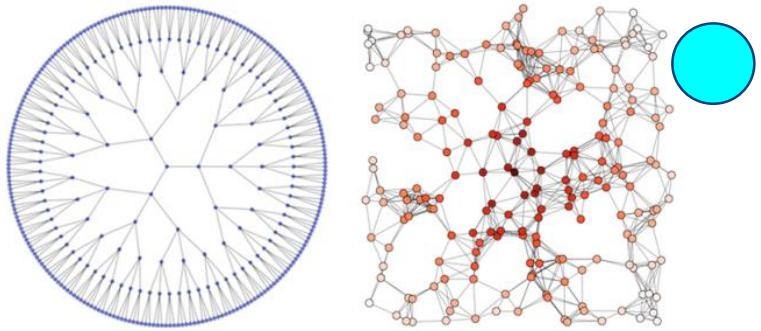


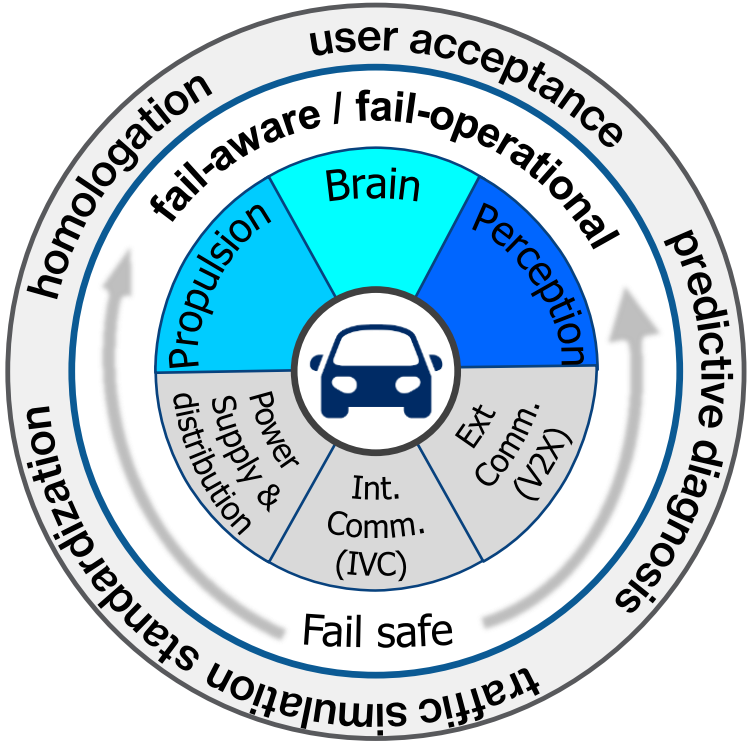

Auto Drive

# The main complexity driver in automated cars (SAE L3, L4, L5) are novel Propulsion- Perception- and automated brain sub-systems beyond today´s fail-safe level

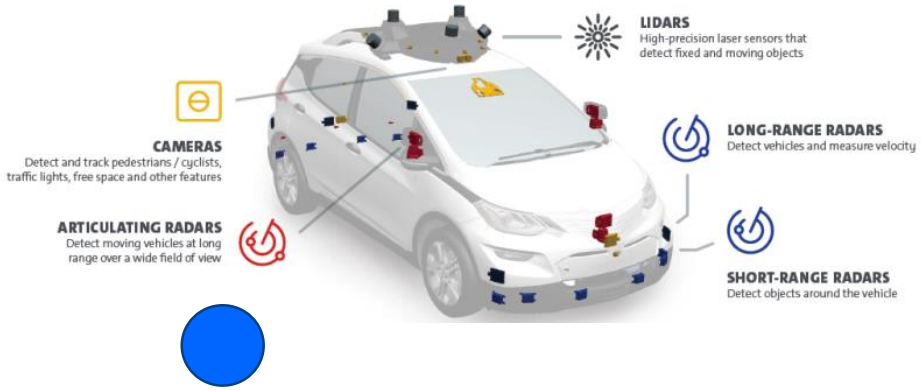


Automated cars need to make life-saving decisions – in a fraction of a second. It would be foolish if they acted upon information from only one source. The brain of the system will be the data processing unit – the number cruncher!



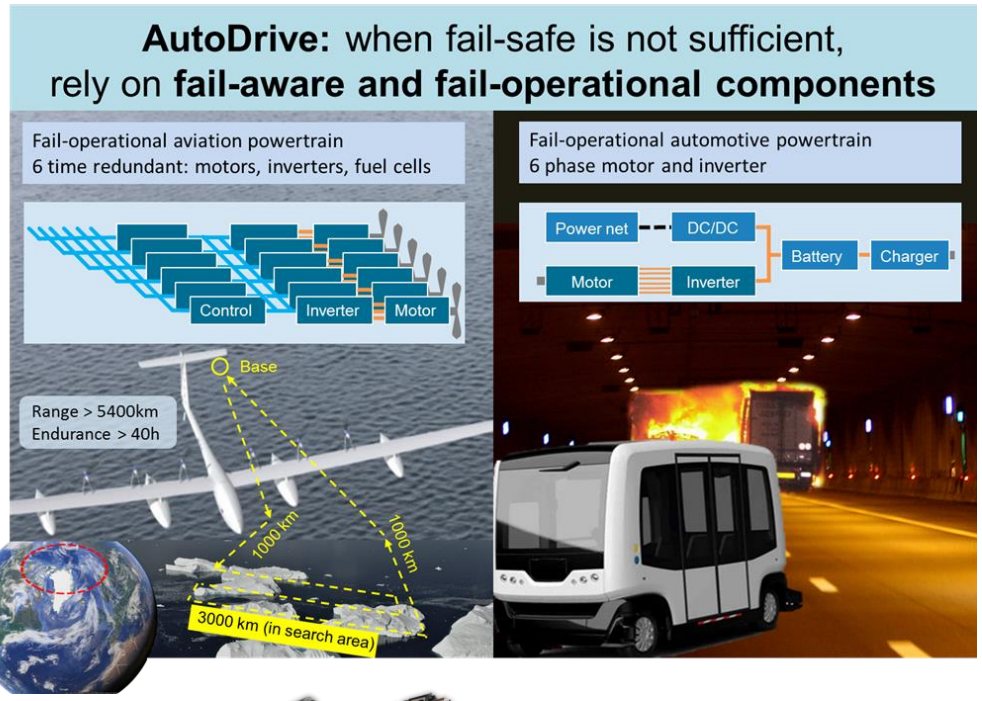


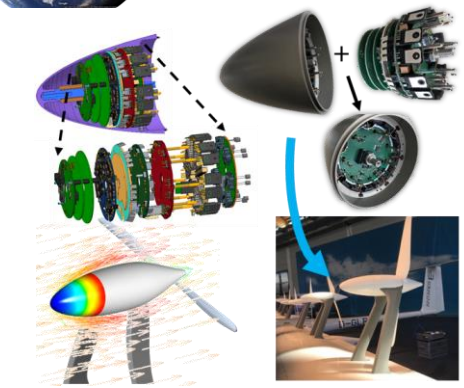

**Key Visual for overview (animated)**




The L3,L4,L5 needs work on the redundancy principle.: Different signals are compared and only when data is consistent, the car will act upon it. For example, a front facing light based sensor (LiDAR) combined with a camera could tell the vehicle not only that there is something in front of it but that it is a pedestrian and the emergency braking should be actuated immediately.

# Behind the tunnel : Aviation and Automotive benefit from each other



Aviation

Automotive

| safe stop level | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|
| safe stop location | emergency stop on ego lane | comfortable stop on ego lane | rightmost lane | emergency lane | emergency bay | parking area | mission completed |

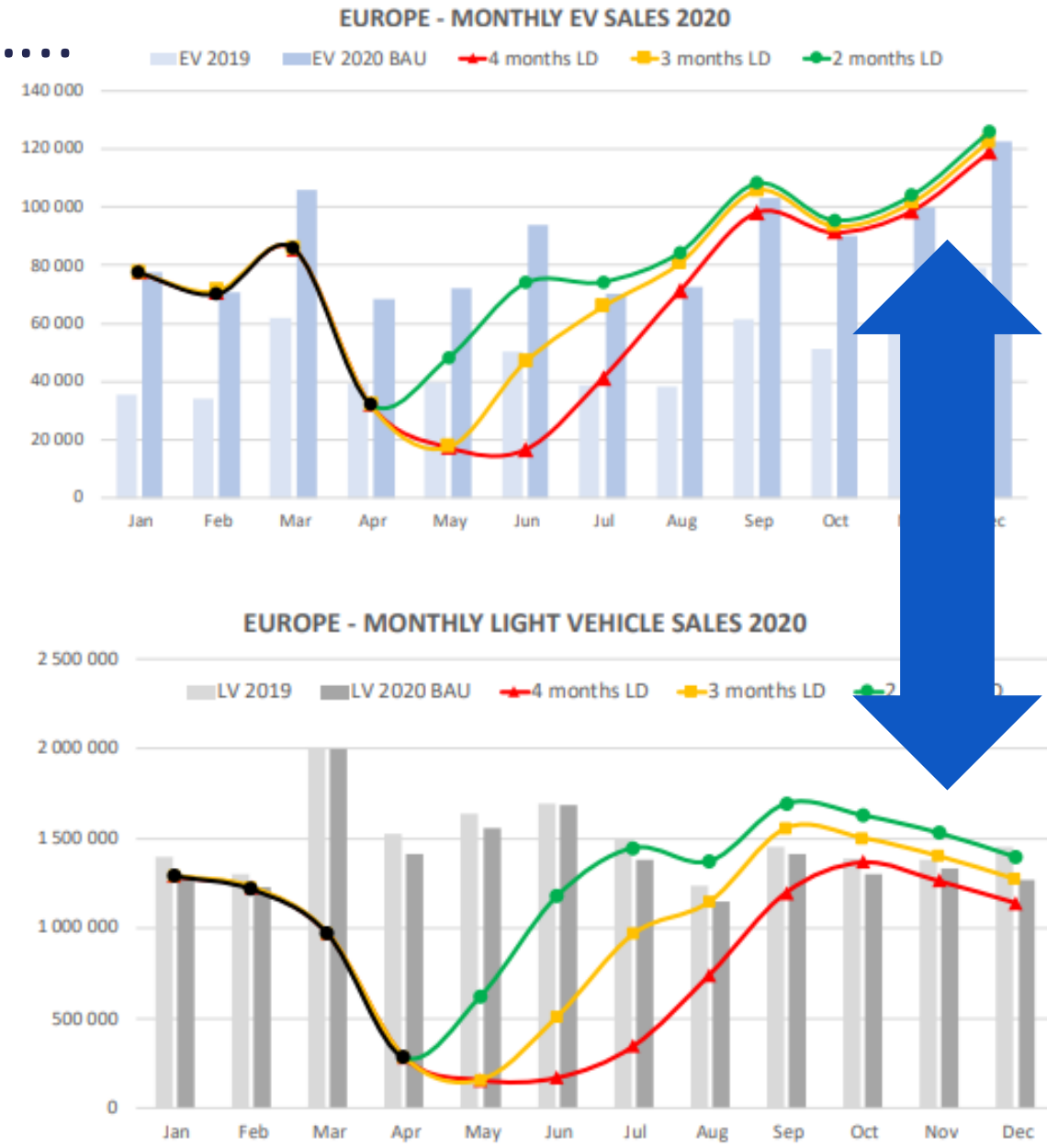
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| considered scenarios | use case | UAS-Restricted, SSL 6 | UAS/UAT-Urban, SSL 4/5 | UAT-Intercity, SSL 4/5 | UAS/UAT-Urban, SSL 2 | UAT-Intercity, SSL 2 | |
| | worst case maneuver in degraded mode | Hypothetical scenario with longest possible residual travel time: Curve with decreasing radius, starting speed 25km/h and limited sum of lateral & longitudinal acceleration (<1,5m/s²) | Multilane city crossing, ego vehicle on the left lane with two vehicles in front of a traffic light: Waiting and creeping (3 phases) + pass crossing in degraded mode + perform lane change (stop&go) + move vehicle to the edge of the road | Multilane highway stop&go, ego vehicle on the left lane: 3x lane change (stop&go) + move vehicle to edge of the road/side lane | Multilane city crossing, ego vehicle on the left lane with two vehicles in front of a traffic light: Waiting and creeping (3 phases) + pass crossing in degraded mode + perform lane change (stop&go) + drive to park area or alternative location in stop&go situation (1km) | Multilane highway stop&go, ego vehicle on the left lane: 3x lane change (stop&go) + drive on right lane to next parking area (20km, mixed congestion & free ride) + exit highway & stop vehicle on parking area after several driving maneuvers | |
| residual vehicle performance requirements | propulsion capabilities [km/h] | no / 0 | 15 | 15 | 30 | 65 … 80 | |
| | acceleration capabilities [m/s²] | no / 0 | +0,75 | +0,75 | +0,75 | +1,25 | |
| | travel distance to safe stop [km] | rolling / 0,03 | 0,11 | 0,13 | 1,1 | 20,8 | |
| | travel time to safe stop [min] | rolling / <0,2 | 6,9 | 6,9 | 15,2 | 77,6 | |

AutoDrive

# ECAS as safe heaven in troubled water…..

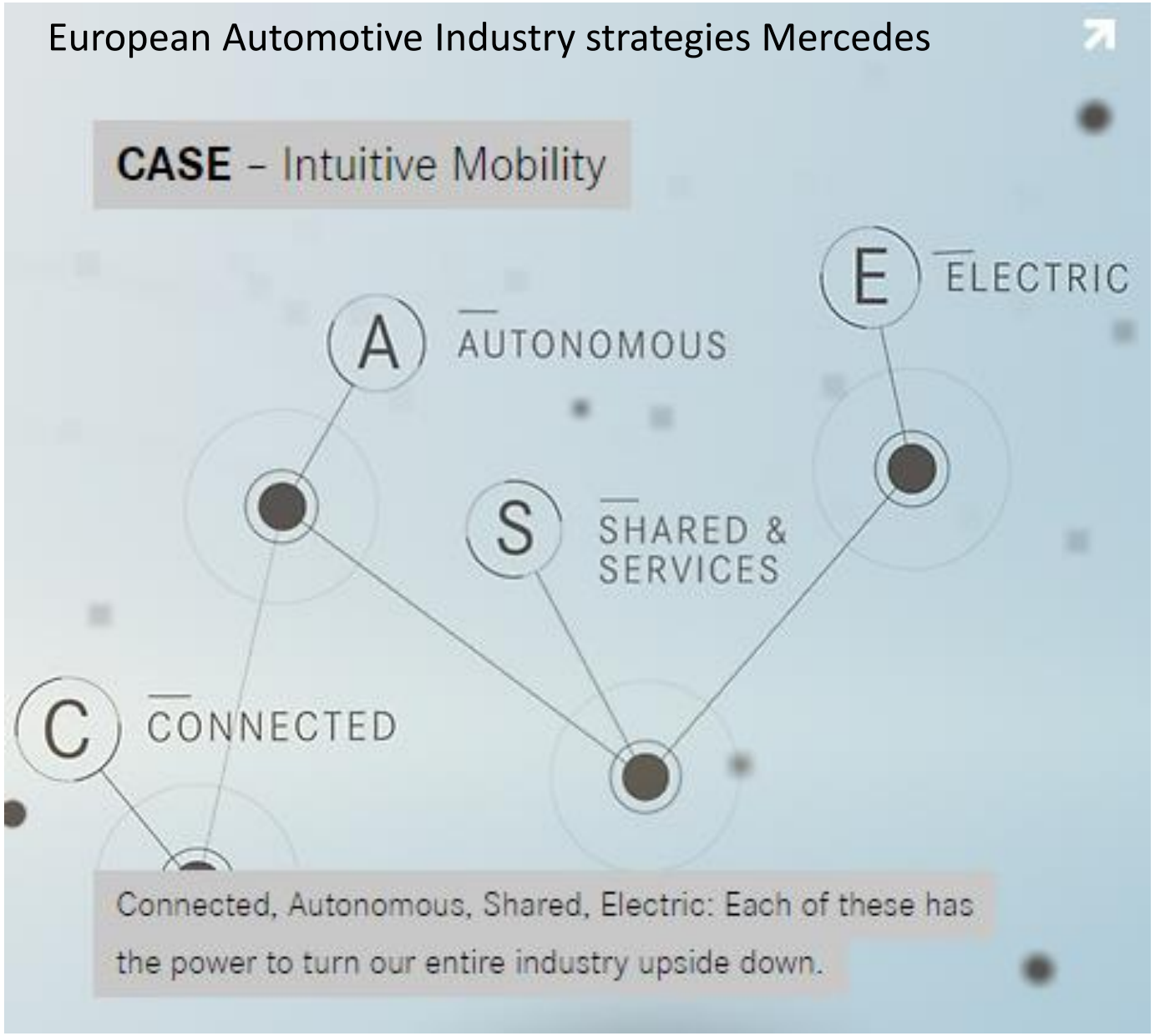
Why AutoDrive ?

1. Fully automated Shuttle  and aircraft targeting SAE L5;
2. Highly automated driving BUS SAE Level 4;
3. Cooperative active safety car for automated driving L3;
4. Highest efficiency Fail-operational 800V automotive powertrain
5. Safe, secure and low latency communication
6. Acquisition, 360° sensing, perception, and environmental awareness;
7. Embedded intelligence and systems for automated driving;
8. Fail aware components and health prediction.




**$6,3 Billion investments in e-Mobility start-ups H1 2019**

## European Automotive Industry strategies Mercedes



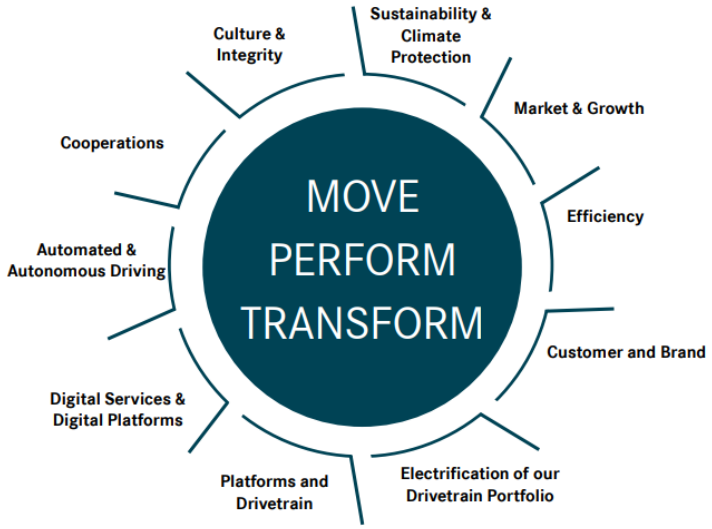

DAIMLER AG

**ROADSHOW PRESENTATION**

October 2020


DAIMLER GROUP

**SUSTAINABILITY AS AN INTEGRAL PART...**



# Message from the market
# Mercedes strategic priorities

## MERCEDES-BENZ CARS & VANS
## ELECTRIC FIRST

Today

Powertrain flexible architecture


EQC


EQA


EQB

Dedicated large electric platform (EVA)


EQS

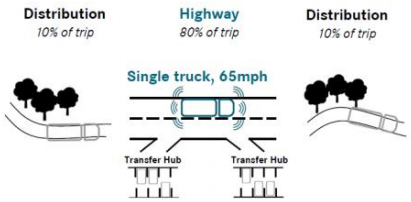

EQE


EQS-SUV


EQE-SUV

Dedicated compact and mid-size electric platform (MMA)[1]

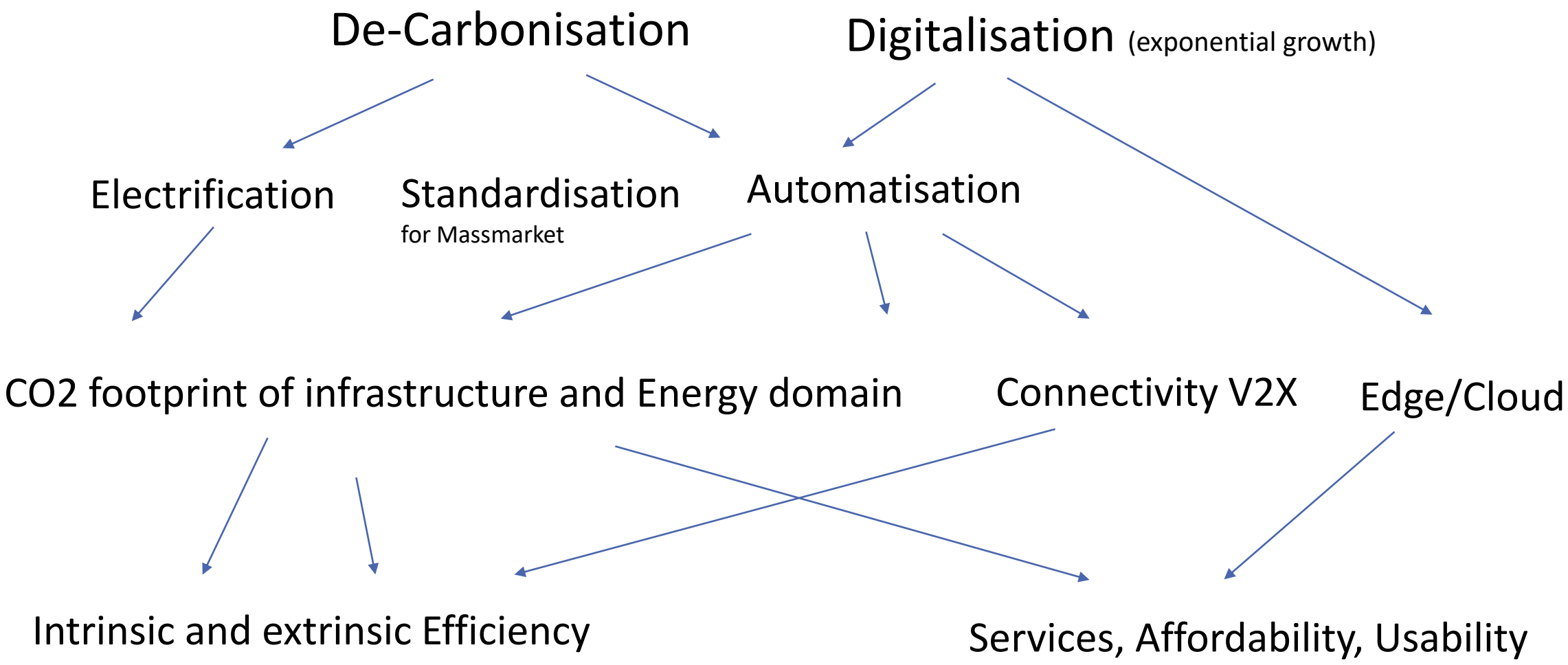
DAIMLER TRUCKS & BUSES
**AUTONOMOUS**




# E-mobility trend pays off in crisis for the semiconductor industry

No additional Corona prevention measures in semiconductor manufacturing

# Semantic – Layer ECAS and future




[Max ~some %]

[est. 20-30% overall]

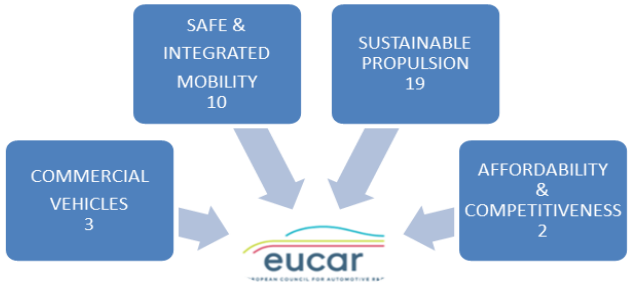
> 50% ECAS by 2030

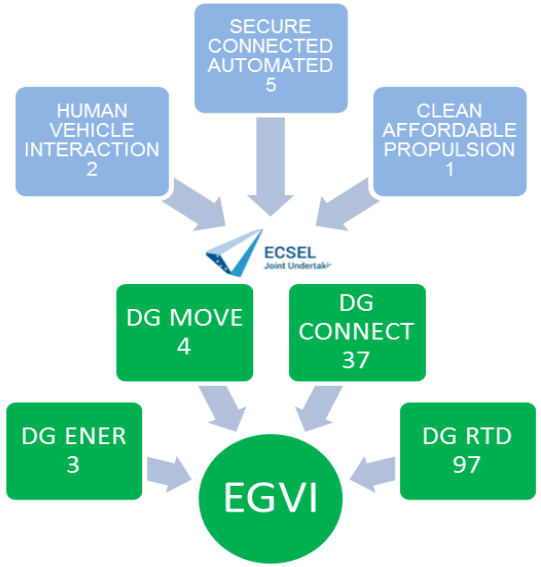
Auto Drive

# AutoDrives facilitates synergy and collaboration

## Mobility.E Activities

- Mapping Current Mobility Research Effort
  - Access to 157 mobility related projects in the portfolios of LIASE members and ECSEL JU
  - First screening for ECS related projects is ongoing



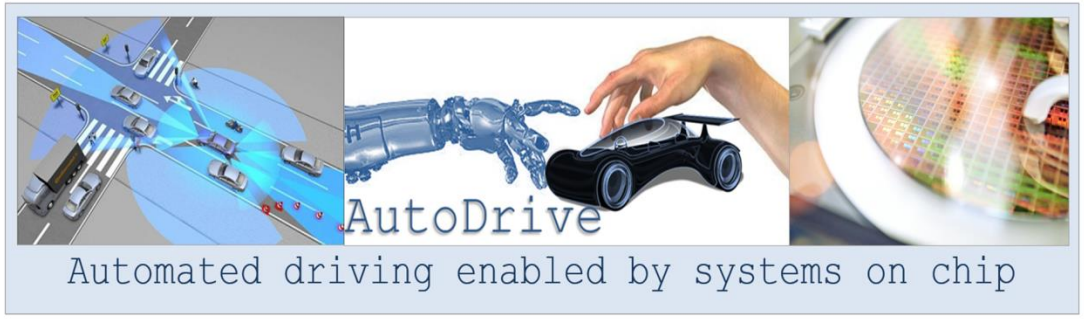





Bert deColvenair Executive Director
ECSEL JU

ECSEL JU

European Commission



## We make driving as safe as flying

by fail-aware, fail-safe + fail-operational electronic components, systems and architectures for highly and fully automated driving

AutoDrive has been accepted for funding within the Electronic Components and Systems For European Leadership Joint Undertaking in collaboration with the European Union's H2020 Framework Programme (H2020/2014-2020) and National Authorities, under grant agreement n° 737469.