

DAIMLER

Daimler Technology – Automation, Electrification, & Connectivity

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Daimler is the global leader in mobility which includes the manufacturing of heavy trucks, buses, and luxury vehicles



DAIMLER



Mercedes-Benz



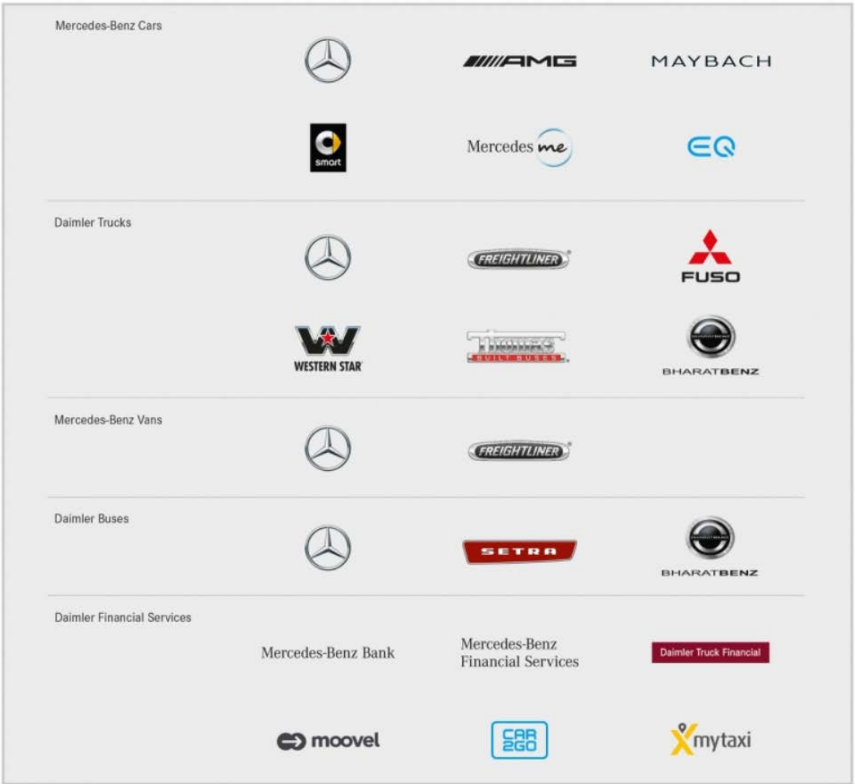
Daimler Trucks North America, LLC (DTNA)



Chief Executive Office: Roger M. Nielsen

Main Locations in the U.S. & Employee Count

- Portland, OR (HQ)
- Redford, MI
- High Point, NC
- Cleveland, NC
- Mount Holly, NC
- Gastonia, NC
- Gaffney, SC
- Fort Mill, SC
- Other locations
- U.S. Employees = Over 14,000**



Notables:

- Market share leader in the United States for Class 6-8 trucks, leader in safety, efficiency, and manufacturing
- 2015: First licensed automated truck to operate on public roads – The Freightliner Inspiration
- 2017: Launched the fuel efficient New Cascadia with the most advanced active safety system in the industry, Detroit Assurance 4.0
- 2017: Launched the industry leading Detroit Connect telematics system with advanced diagnostics, data acquisition, and analytics
- 2018: Detroit Assurance active safety system is made standard in all New Cascadia Class 8 vehicles
- 2018: Active testing in the US for Level 2 coordinated braking platooning technology
- 2018: Established Automated Truck R&D Center and announced e-Cascadia, e-M2, and e-TBB products





Daimler Pillars

Safety

Efficiency



LEADING THE CHARGE

Automation



Electrification



Connectivity



Intuitive Mobility

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Intuitive Mobility

2015 - First Licensed Operation of an Automated Commercial Truck on an Open U.S. Public Highway



Platooning

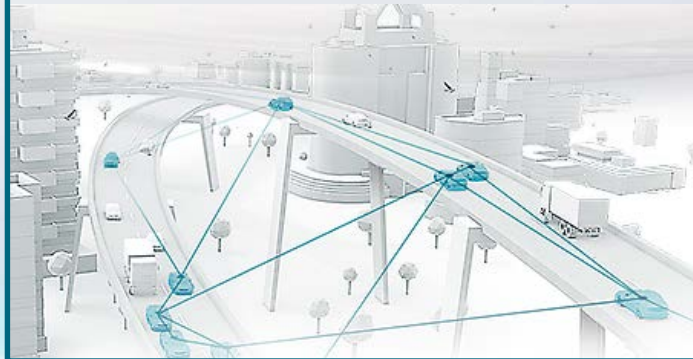
Safety

- Increased sensing capability
- Coordinated Braking
- Reduce Driver fatigue
- Active lane assist



Connectivity

- V2V Broadcast & Integration
- Infrastructure Integration
- Additional safety features

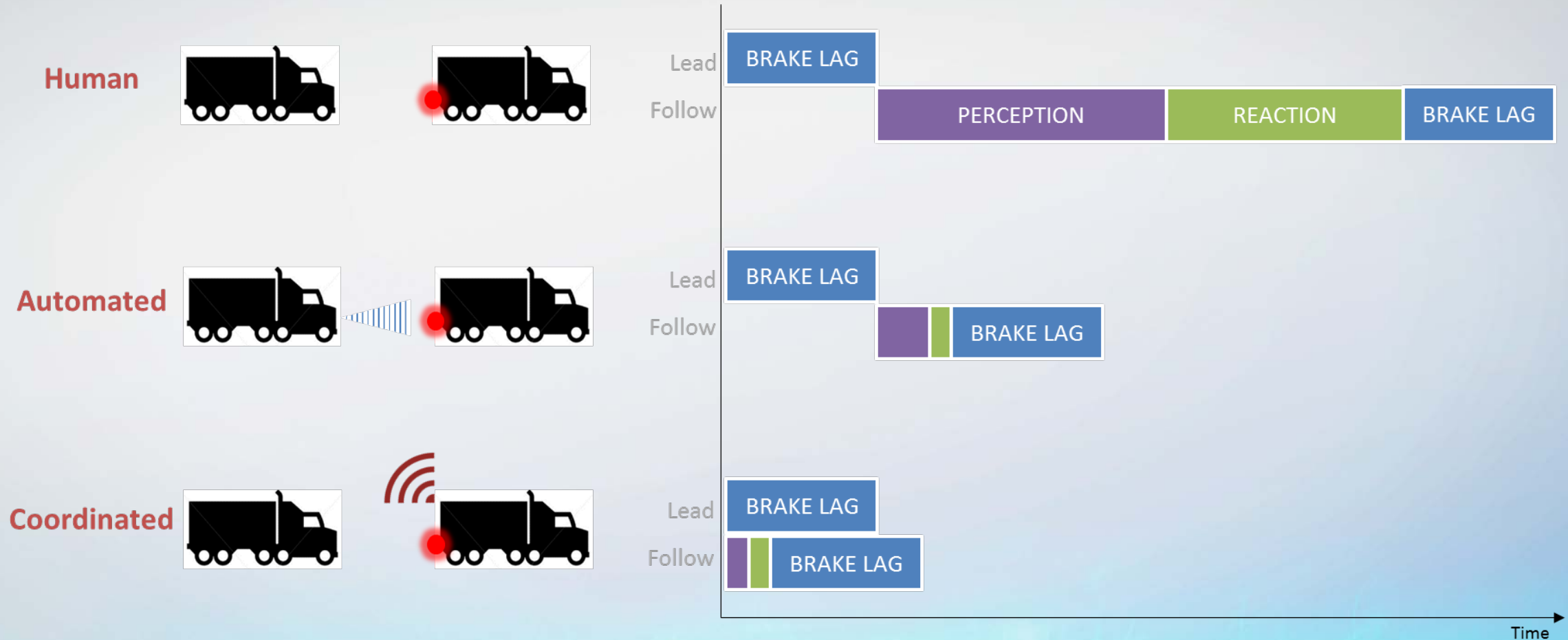


Efficiency

- Lower operating cost
- Lower emissions
- Greater range
- Congestion reduction



Platooning



- 45% of braking distance depends on **human perception and reaction**
- 38% of braking distance reduced by coordinated braking using DSRC

Platooning

Technical Design Challenges for a Safe Implementation

- Vehicle positioning & identification
- Vehicle cut ins - allowing space for merging or overtaking vehicles
- Emergency braking scenarios
- Evasive maneuvers
- Environmental interference
- Single vs Multi-Lane use
- Coordinated Braking Strategy
- Functional safety

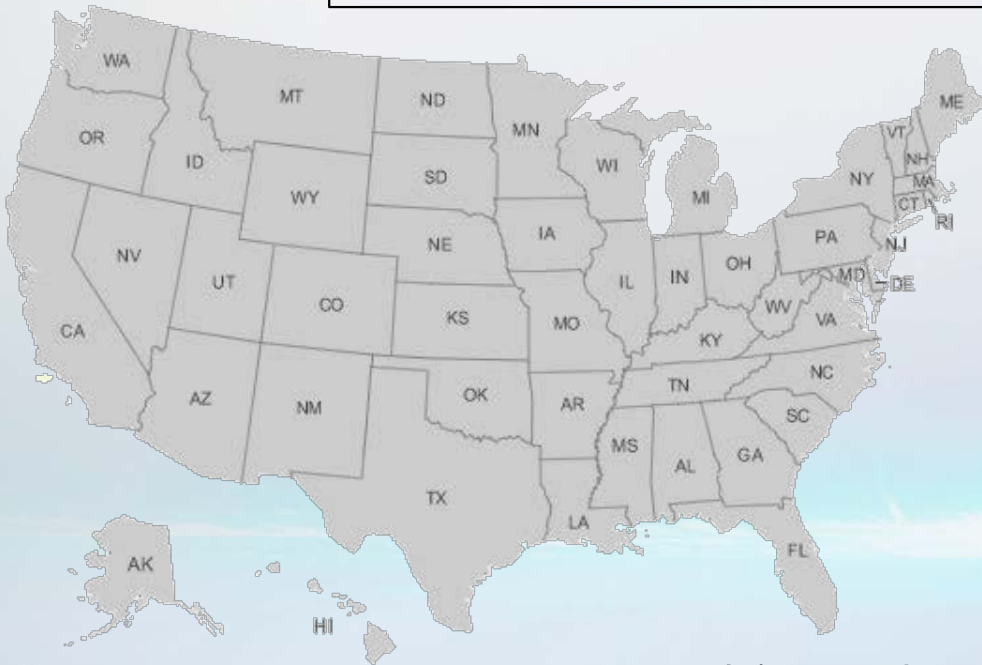


Platooning system safety tests being conducted at Daimler's closed course facility in Madras, OR

Platooning

Regulatory Considerations for testing and deployment:

- Location restrictions (e.g. outside business district, city limits)
- Following distance and caravan laws
- Implications for bridge loading
- Liability
- External Visual indication (e.g. lights, signage)



Align and collaborate with regulatory organizations

Platooning



- Vehicle Connectivity enables opportunities for safety and efficiency improvements
- Requires detailed system knowledge & deep system integration
- Platooning function leads to highly stringent safety goals and system requirements
- ... and don't forget ... Testing, Testing, Testing

Safety is our top priority!

Automated Truck Technology

What does it
mean?



What is the
impact?

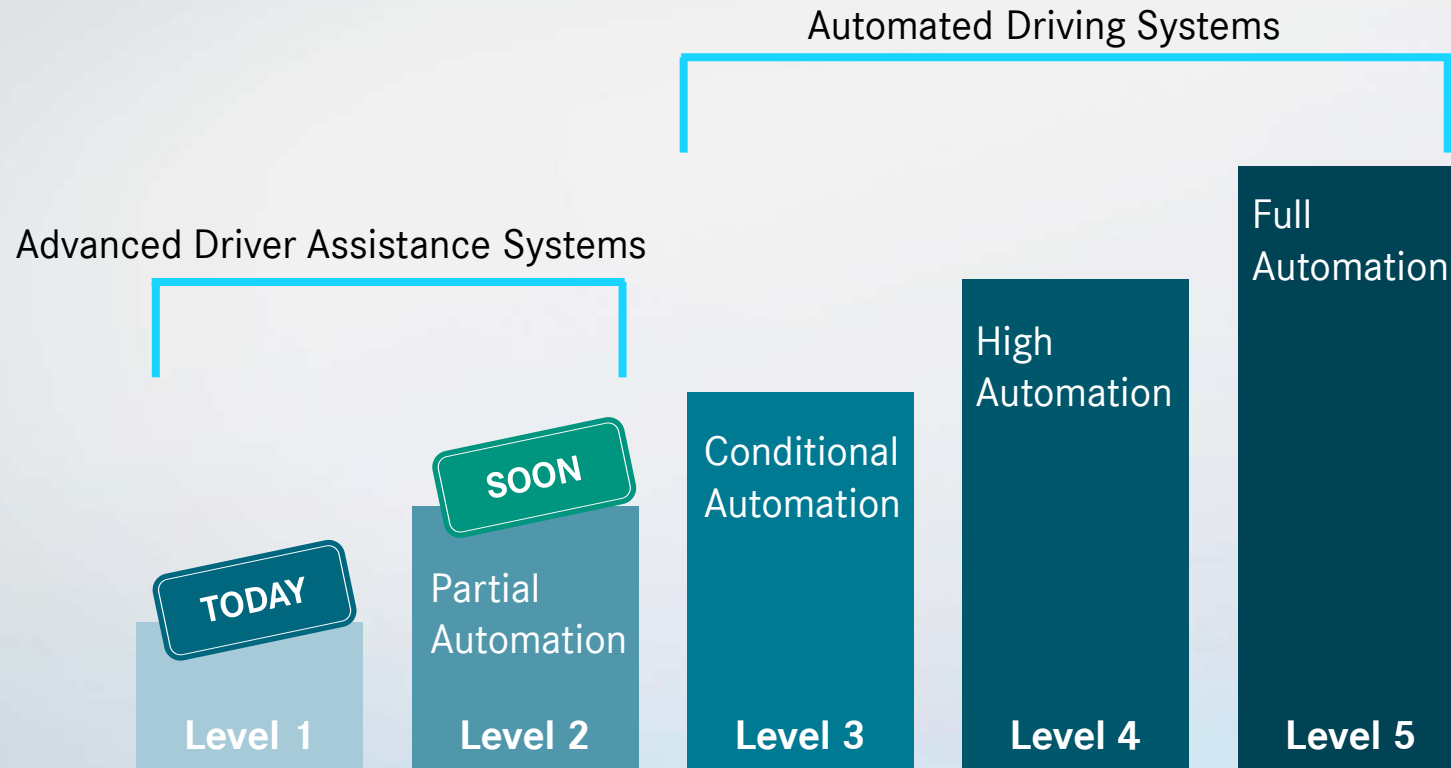


How will it
evolve?



Daimler believes that by striving towards highly automated driving technology, this will accelerate the evolution of safety technologies that will reduce crashes and save lives

Autonomous is still ways to go...



- We need a technically **100% reliable solution**, **Safety is our priority**
- We need **acceptance** from public and **confidence** from customers
- We need a **legal and regulatory framework** for operation and liability

Safety will dictate our timeframe of deployment of automated driving systems

We are pioneering automated driving, features from demos end up in product launches - Examples

Future Truck

World premier of automated vehicle on the road



Inspiration Truck

Premier on USA highway



Highway Pilot

Test license for German Autobahn



Highway Pilot Connect

World premier of platooning



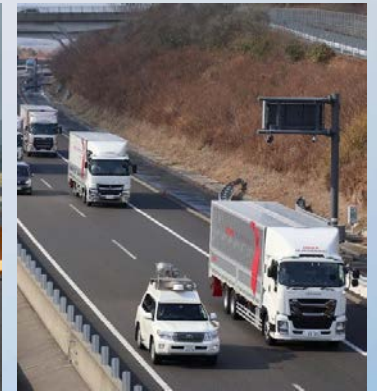
Automated snow removal

Test operations with Fraport



Truck Platooning

Testing in USA & Japan



2014

2015

2016

2017

2018

It's a long way from a demo...to a customer viable product

**Reliability/
Uptime**

**All
weather
conditions**

**Reduction
of crashes
and fatalities**

**All regions/
streets**

**Seamless
integration
into customer
process**

**All
situations
incl. the
unknown**

Building a real Autonomous Truck is a tough game!



Global Automated Truck Research & Development Center opening in Portland

Center for
automated
driving
pioneers

Global R&D
network
US, Germany,
India, ...

Global
modular
technology
platform
across brands

Automated Truck Research & Development Center

Synergies with
Daimler car
technology

Defining the
future of
transportation

Automation
and
workforce

The Road to Autonomous Vehicles



- As the level of automation in trucks increases, the role of the driver will change to reflect the improved capabilities of the vehicle
- Application of automation to use cases will happen incrementally – designated routes or tasks
- Testing and Validation need to be highest priority!
- Societal and Regulatory factors must be considered along the way



The Goal: Getting from Point A to Point B as Safe, Efficient and Reliable as possible

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Automation



Electrification



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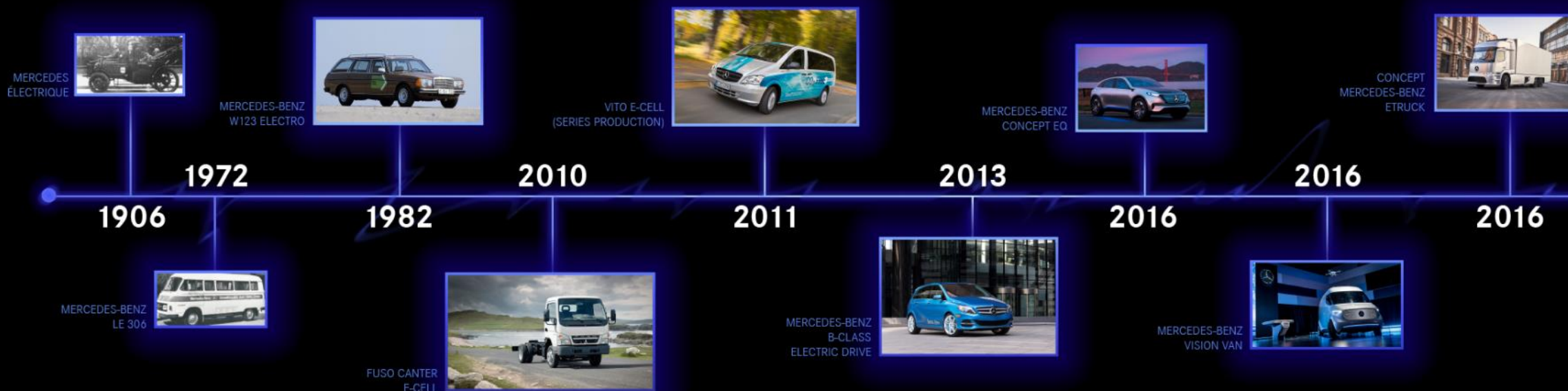


Intuitive Mobility

Daimler has an extensive electric vehicle history – we are experienced

Daimler Commercial Trucks on the road
Leveraging global EV engineering expertise

POWERED BY DAIMLER THROUGH HISTORY



Daimler is delivering production level commercial electric vehicles today with more in process

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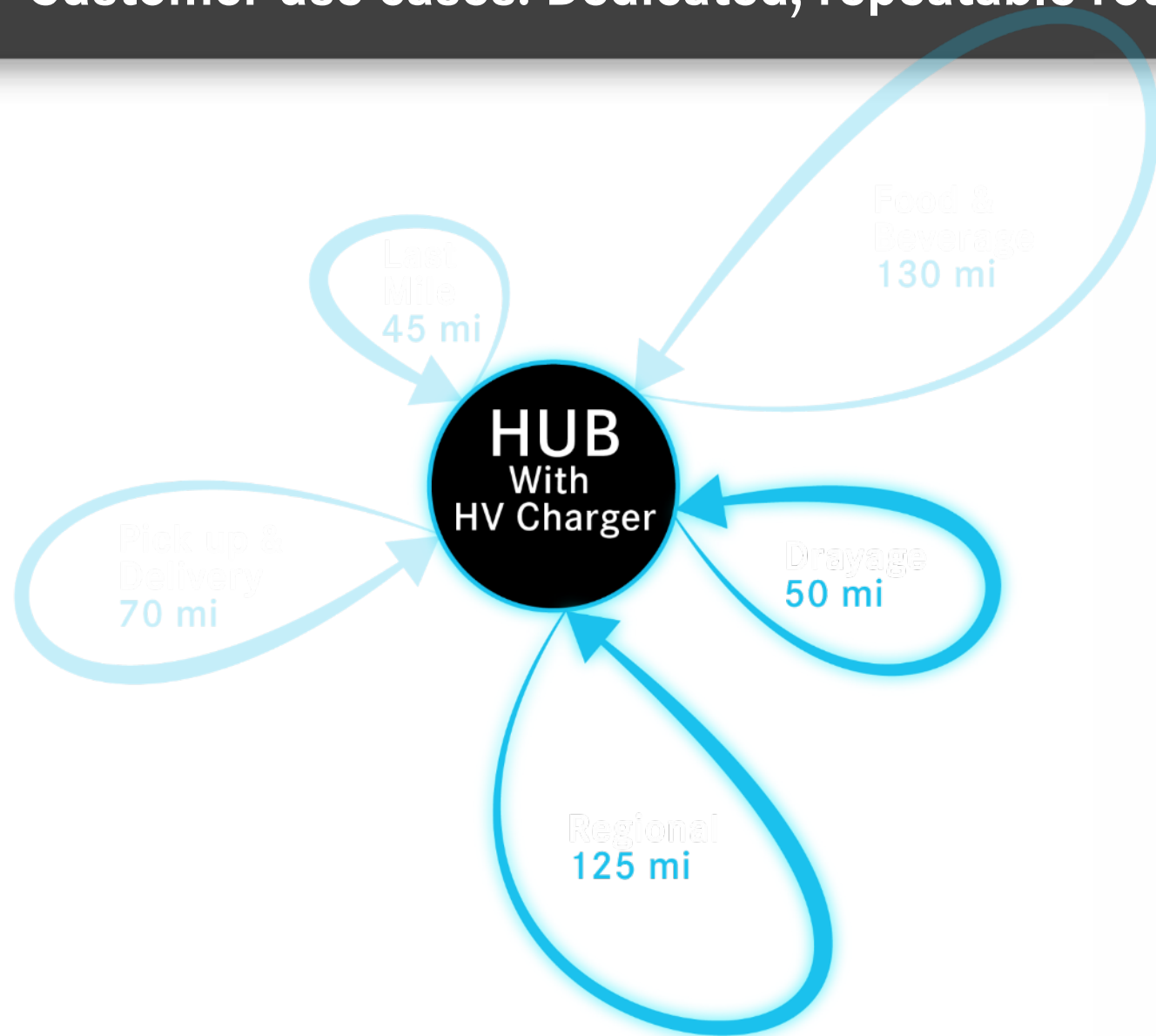


Meet DTNA's electric vehicle line up



Presenting the DTNA electrified commercial vehicle family: Class 6-8 + TBB Jouley

Customer use cases: Dedicated, repeatable routes are practical for eTrucks



PORT TO STAGING LOT PORT TO INTERMODAL TRANSFER

Dedicated route, consistent charger location, heavy-haul, predictable environment

Daily use:

2-3 round trips to/from port

Daily mileage < 150 miles

PICK UP AND DELIVERY

Dedicated route, consistent charger location

Daily use: 1 round trips from warehouse to multiple drop off points

Daily mileage < 150 miles

LEADING THE CHARGE

Automation



Electrification



Connectivity



Intuitive Mobility

Virtual Technician



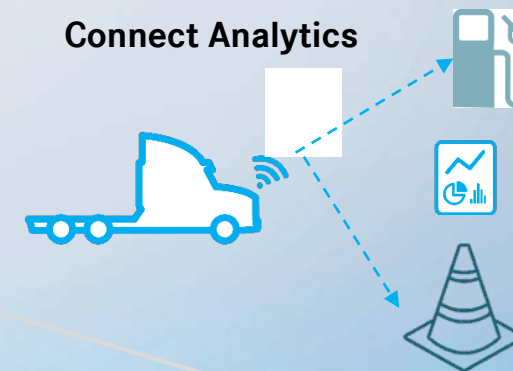
Remote Updates



Detroit Connect Direct



Connect Analytics



3rd Party Hosting





DETROIT™ Detroit Connect is DTNA's suite of connected vehicle services



Uptime:

Virtual Technician

Expanded Faults – GHG17,

Transmission and Safety System

Flash Over The Air

Remote Engine Parameter Change



Fuel Economy and Performance:

Connect Fuel Performance Analytics

Fleet and Trip Fuel Analytics

Fuel Efficiency Driver Scoring

Trip Reporting



Safety:

Connect Safety Event Reporting

Vehicle and Fleet Scoring

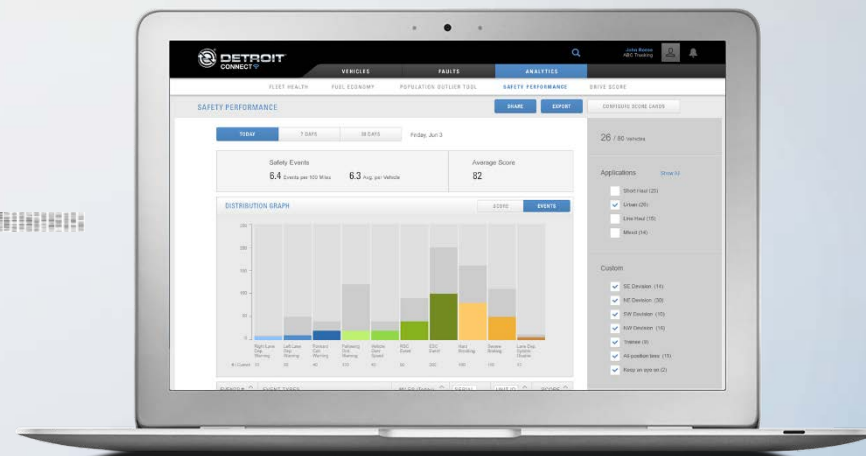
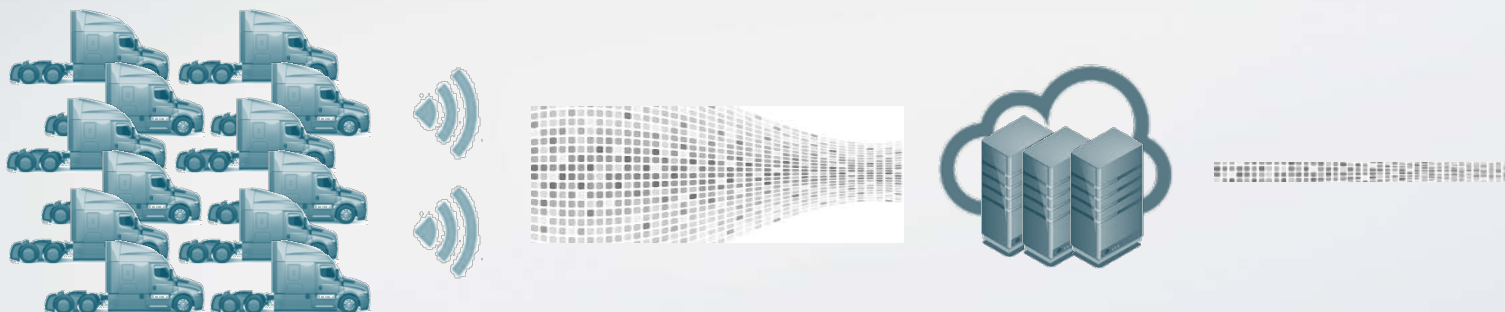
Safety Event Detail Viewer

Detroit Connect Web Portal and Mobile App

One Stop Shop for ALL DTNA Connected Vehicle Services



Detroit Connect Analytics



Fuel Performance Analytics

Single Vehicle Trip Reporting
 Fleet Level Analytics
 Fuel Efficiency Driver Scoring



Safety Event Reporting

Vehicle and Fleet Scoring
 Safety Event Detail Viewer

Thank You

