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CONNECTED TO THE FUTURE

FICOSA

Driving the future

Connected and autonomous vehicle
New technologies

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Ficosa Driving the Future

1- Connectivity & Smart Cities

2- Child Presence Detection

3- Camera Monitoring System

1- Driving the Future: Connectivity & Smart Cities

Intelligent Transportation : V2x Technology & its benefits

- Enhance safer driving to prevent traffic accidents.

  According to NHTSA*:

  - ~ 6.5 million crashes / year
  - ~ 37 K fatalities
  - ~ 2.7 million injuries

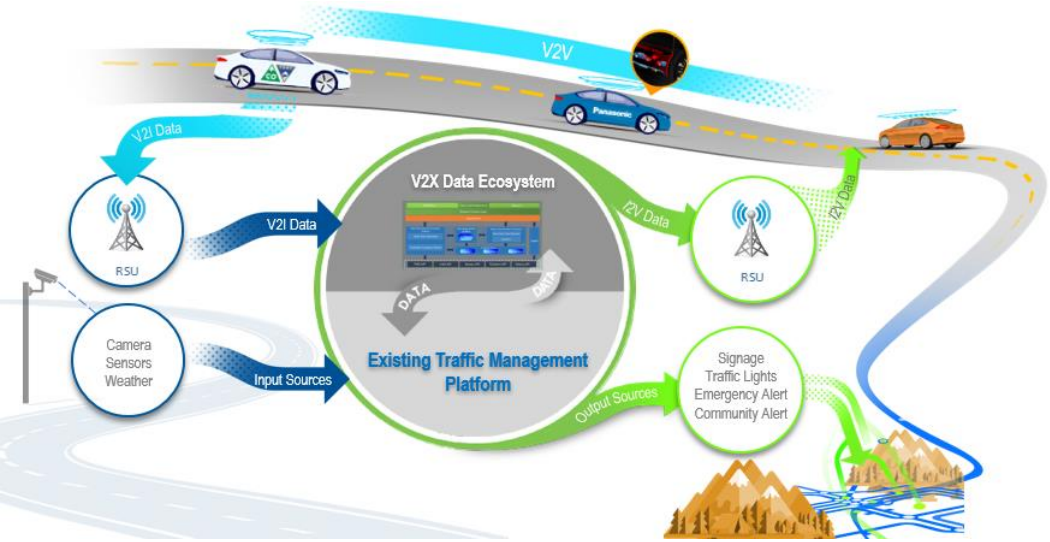
  ~ 445 billion $ / year

  - ~ 615K vehicle crashes could be prevented using V2x Technology
- Enable fuel efficient driving in cooperation with roadside infrastructures
- Improved traffic management

* NHTSA = National Highway Traffic Safety Administration
More data on https://injuryfacts.nsc.org/

1- Driving the Future: Connectivity & Smart Cities

V2x Ecosystem

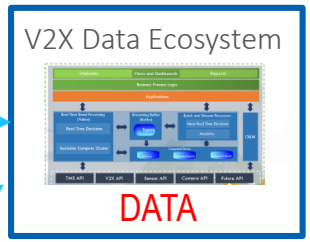


V2x = Vehicle to Everything (i.e Vehicle to vehicle, Vehicle to infrastructure, Vehicle to Pedestrians…)
Passing information from a vehicle to any entity that may affect the vehicle, and vice versa.

1- Driving the Future: Connectivity & Smart Cities

Use Cases

Additional Connected Areas

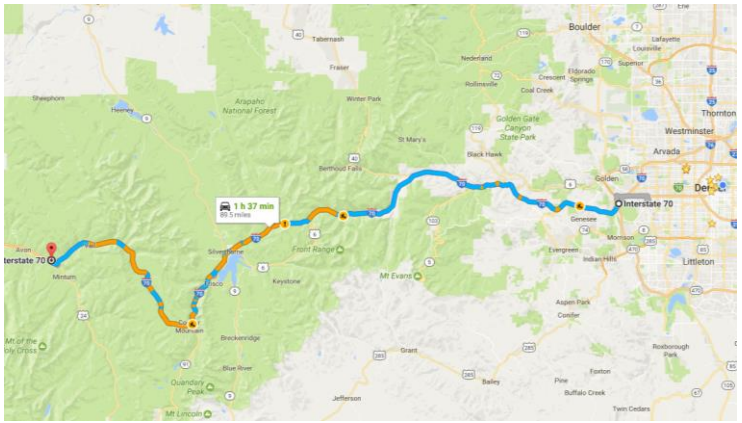


- Crashes
- Road Closures
- Weather Conditions
- Potholes (Through Vehicle Sensors, i.e suspension)
- Brake Warnings
- Infrastructure Diagnostics
- Parking Availability
- Incident Management
- Enhanced Maintenance Decision Support Systems

1- Driving the Future: Connectivity & Smart Cities

Example I-70 corridor in Colorado

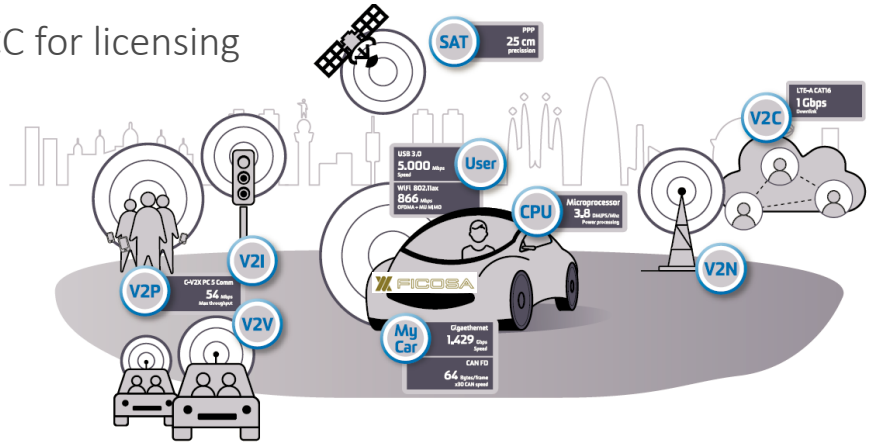
- 90 mile segment from Denver (MM260) to Vail Pass (MM170), including Veterans Memorial Tunnels and Eisenhower Johnson Mountain Tunnel (EJMT)
- Divided, interstate highway with junctions to US-6, US-40, SH-9, and US-24 with limited alternative routes



1- Driving the Future: Connectivity & Smart Cities

Ficosa Role & achievements

- Equip vehicles for the 1st US pilot using C-V2x technology (CDOT) during 2019
- Support in expanding V2x ecosystem to other US-DOTs, OEMs & testing trials
- Support to define standards & certification process (Plugfests, FCC, Omniair…)
- Actively comment & provide data for the correct FCC for licensing spectrum, potential regulation from NHTSA.



CDOT = Colorado Department of Transportation
US-DOTs = United States Department of Transportation
FCC = Federal Communications Commission
NHTSA = National Highway Traffic Safety Administration

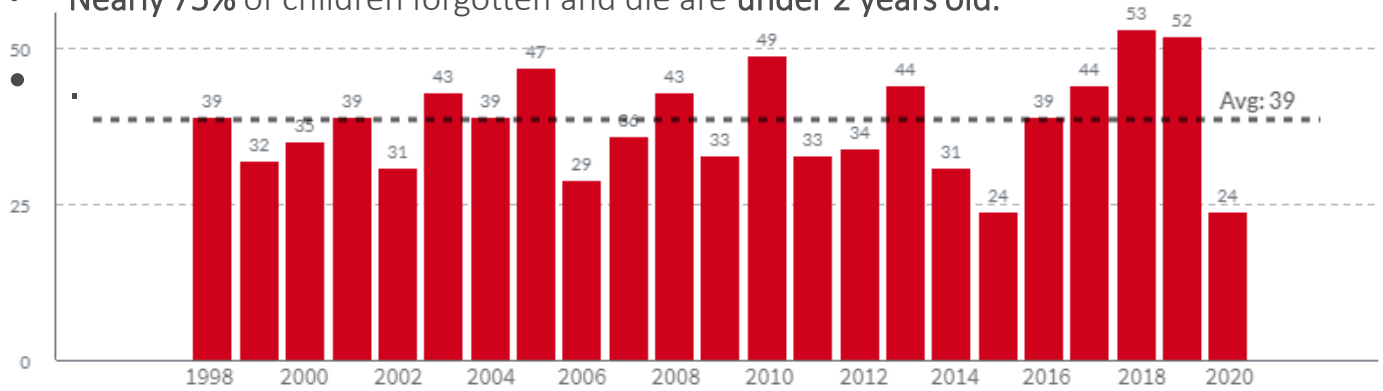
2- Driving the Future: Child Presence Detection

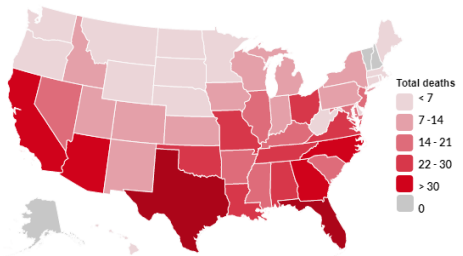
Child heatstroke deaths in vehicles (US)

- Since 1998 about 876 children have died from heat stroke in US. Peaks in 2018-2019. **Average = 39 deaths/year**
- Temp. inside a car can reach 110 ºF (43 ºC) even outside Temp. is as low as 57 (14 ºC)

(It only takes 10 minutes for a vehicle's interior temperature to rise nearly 20 degrees, and a child's body heats up three to five times faster than an adult's)

- ~ 46% of occasions when child was forgotten, the driver thought to drop the child off at a daycare or preschool.
- Thursdays and Fridays — the end of the workweek — have had the highest deaths.
- **Nearly 75%** of children forgotten and die are **under 2 years old.**





Data from https://injuryfacts.nsc.org/

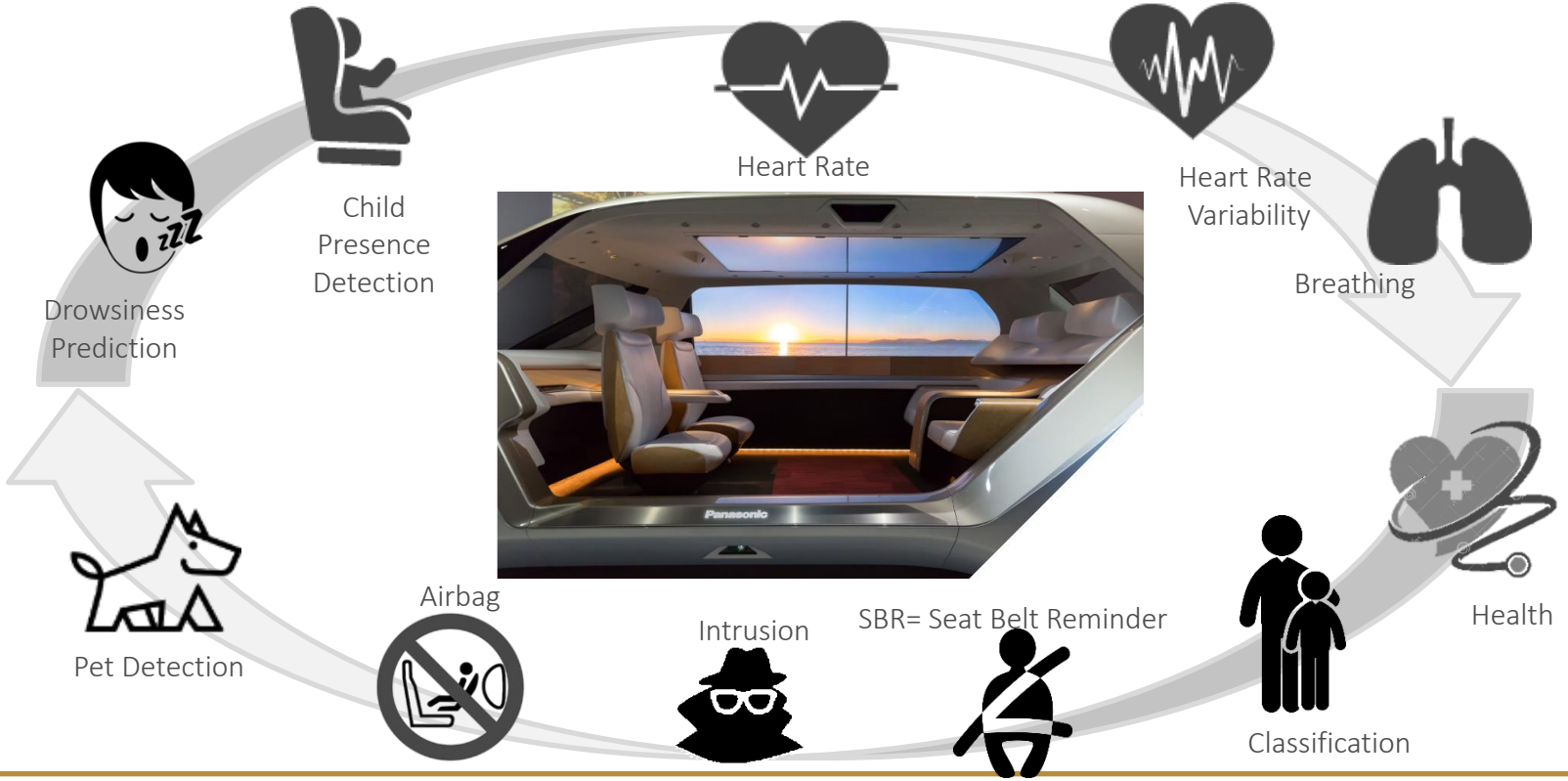
2- Driving the Future: Child Presence Detection

Radar Technology & its benefits

- Detects body micro-vibration
- Extract other main vital signs Breathing and Heart rate
- Able to combine/fusion with other technologies
- Reduce the system cost by adding other functionalities SBR, Classification…

2- Driving the Future: Child Presence Detection

Radar Technology & its benefits



2- Driving the Future: Child Presence Detection

Ficosa Role & achievements

- Benchmark and compare different technologies (ultrasound, cameras, other UWB-radar)
- Knowledge on regulatory landscape around Radar Bandwidth (EURONCAP, ASEANCAP vs NHTSA in US)

  Euro NCAP : Protocol with safety rewards on CPD from 2022
  Asean NCAP: Protocol & roadmap 2021-2025
  HOT CARS Act. passed in U.S. House of representatives

- Support Auto Alliance voluntary commitment to introduce better & safer systems on MY25 onwards
- Engaging with elected officials & their staffs; advocacy with congressional leaders and rule makers
- Support waiver requests to the FCC to allow the correct frequency band and emit at higher power

3- Driving the Future: Advance Vision Systems

Camera Monitor Systems: Technology & its benefits

- Eliminate blind to prevent traffic accidents:

  According to NHTSA*:

  - ~ 1.4 Million crashes / year blind spot accidents
  - ~ 6.6 K Deaths / year
- Improve vehicle fuel efficient by reducing weight and drag effect
- Improve glare caused by headlights during night drive
- Improve rear visibility under adverse weather conditions (Snow, Rain)
- Alert drivers of incoming emergency vehicles and potential hazards

* NHTSA = National Highway Traffic Safety Administration

3- Driving the Future: Camera Monitor Systems

Use Cases

Commercial Vehicle

Electrical Vehicle

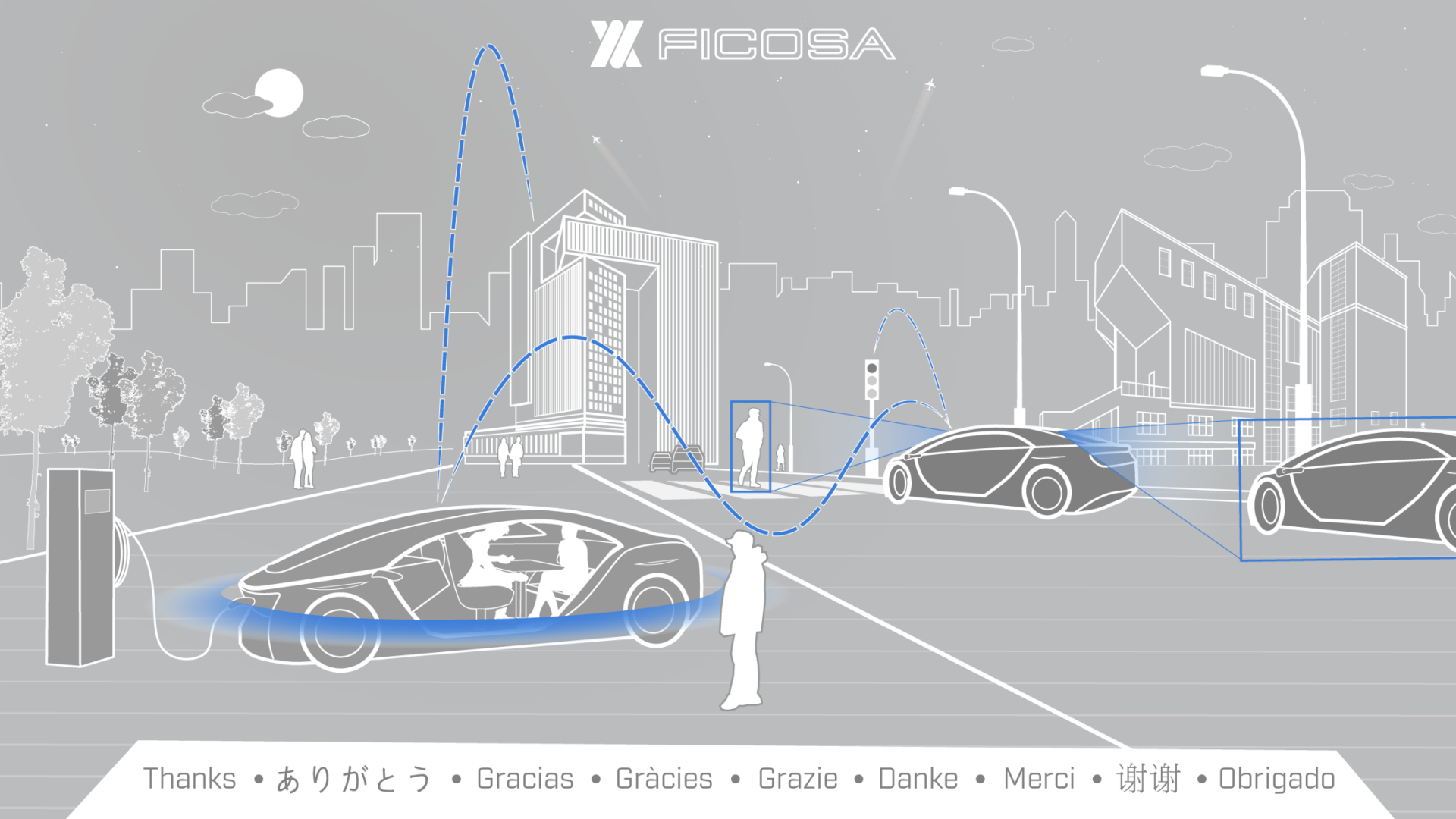
Improved Safety & Aerodynamics

3- Driving the Future: Camera Monitor Systems

Ficosa Role & Achievements

- Address NHTSA concerns with CMS, providing data and support during vehicle tests
- Active member of the SAE committee tasked to define standards & certification process
- Collaborator with multiple OEMs in CMS usability/naturalistic studies
- Part of a consortium that in 2019 finalized a 2-year naturalistic CMS study
- Actively promoting, providing data and know how to New EV OEMs and A-OEMs

CMS = Camera Monitor System
NHTSA = National Highway Traffic Safety Administration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