



# Children in Automated Vehicles

What do we need to know and do?





## **Children in Automated Vehicles**

**The Automated Vehicles Consortium works to ensure that child safety needs are actively reflected in new vehicle designs, regulations, laws and educational messaging.**

**We are encouraged by the expansion of advanced driver assistance technologies and automated driving features, and by their promising potential to prevent or mitigate crashes caused by human error.**

**Our priority is to ensure that stakeholders consider the safety needs of families as these technologies continue to evolve, thereby minimizing the risk of injury and death.**



# Driver Assistance & Autonomy

Safety and convenience features like anti-lock braking and cruise control have been developed since the 1950s.

Advanced safety, driver assistance and foundation systems have existed and evolved since the early 2000s and continue to advance.

# On the Way to Automated Driving

## Advanced Safety Features

- Electronic stability control
- Blind spot detection
- Forward collision warning
- Lane departure warning

## Advanced Driver-Assistance Features

- Rearview video systems
- Automatic emergency braking
- Pedestrian automatic emergency braking
- Rear automatic emergency braking
- Rear cross traffic alert
- Lane centering assist

## Partially Automated Safety Features

- Lane keeping assist
- Adaptive cruise control
- Traffic jam assist
- Self-park

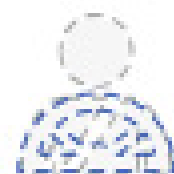
## Fully Automated Safety Features

- Driverless vehicles

# Moving Toward Full Automation

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE) AUTOMATION LEVELS

Full Automation



0

## No Automation

Zero autonomy; the driver performs all driving tasks.

1

## Driver Assistance

Vehicle is controlled by the driver, but some driving assist features may be included in the vehicle design.

2

## Partial Automation

Vehicle has combined automated functions, like acceleration and steering, but the driver must remain engaged with the driving task and monitor the environment at all times.

3

## Conditional Automation

Driver is a necessity, but is not required to monitor the environment. The driver must be ready to take control of the vehicle at all times with notice.

4

## High Automation

The vehicle is capable of performing all driving functions under certain conditions. The driver may have the option to control the vehicle.

5

## Full Automation

The vehicle is capable of performing all driving functions under all conditions. The driver may have the option to control the vehicle.



# Level 1 – Driver Assistance

Vehicle assists the driver with a single task, such as:

- braking
- lane-keeping
- adaptive cruise control

**Increasingly  
common features  
of vehicle models  
for over a decade**

*(Many vehicles have had these features for the past several years.)*



# Level 2 – Partial Automation

Vehicle assists the driver with ***two or more*** Level 1 tasks

- braking
- lane-keeping
- acceleration
- steering
- adaptive cruise control

**Not considered  
self-driving;  
Human driver  
still required**

*(Examples: Tesla Autopilot, Mercedes-Benz Drive Pilot, Volvo Pilot Assist)*





# Level 3 – Conditional Automation

- Vehicle can self-drive from point A to point B under certain conditions.
- Driver must take control in a moment's notice in an emergency or when conditions change.

*(No current examples exist on the consumer market.)*

**Driver must be present and attentive at all times and ready to take control**

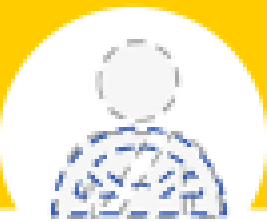


# Level 4 – High Automation

- Vehicle operates autonomously, but in limited situations, such as:
  - Within a set geographical area
  - Up to a maximum speed
  - In favorable weather conditions
- Driver or remote operator may be required for some models and situations.

*(No current examples exist on the consumer market.)*

**Envisioned for  
fixed route  
vehicles,  
like shuttles or  
commercial  
deliveries**



# Level 5 – Full Automation

- Vehicle can self-drive from point A to point B regardless of weather condition or speed
- No driver required
- All humans are passengers
- Some vehicles could be occupantless

**Passengers free to shift focus (to reading, working, watching TV, etc.)**

*(No current examples exist on the consumer market.)*

# How Do New Technologies Help?

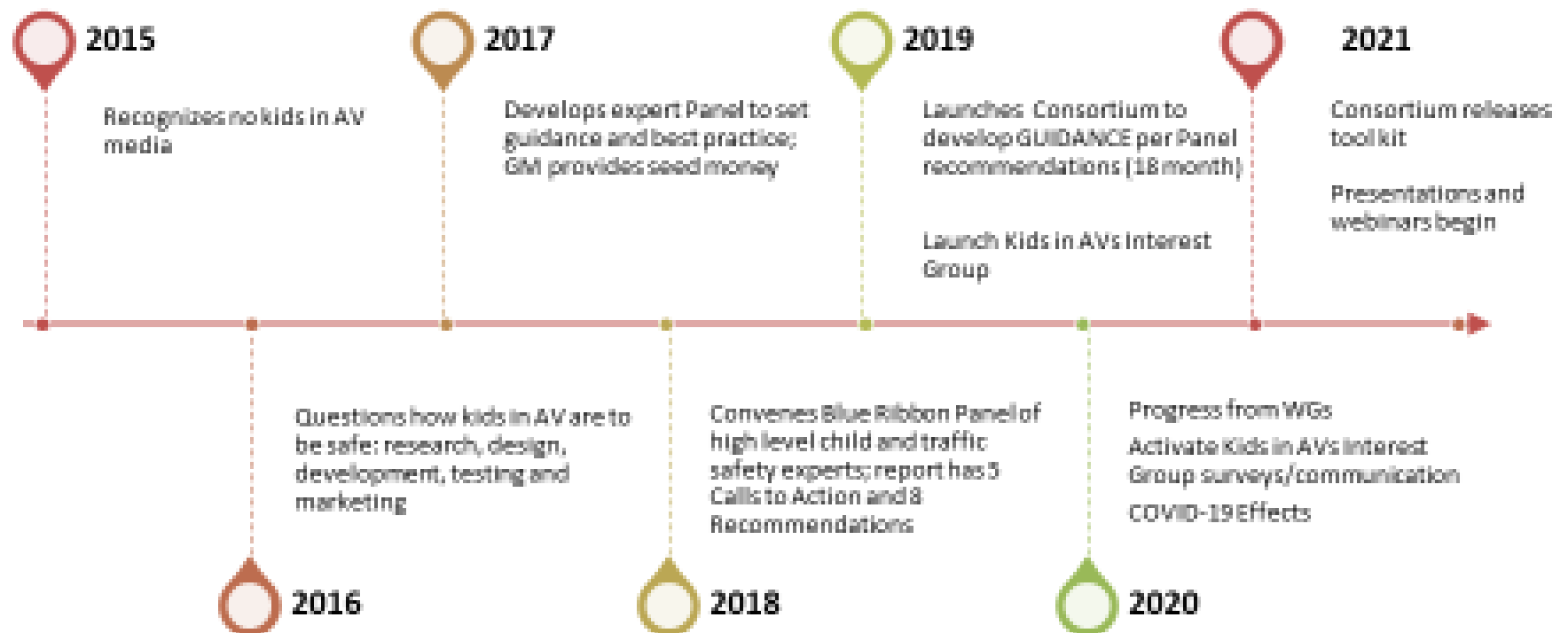
94% of serious crashes are due to human error.

By reducing or eliminating human error, AVs are expected to significantly reduce crashes, injuries and fatalities.

# AV: Additional Possibilities

- **AV Rideshare and other options for families**
  - More accessible mobility for unlicensed individuals
  - More accessible mobility for people with disabilities
  - Independent possibilities for older children
- **Cost Savings**
  - Likely shift in family insurance costs
  - Reduced product costs due to improved delivery efficiency
- **Further Potential**
  - Less need for parking space if vehicles are share/active
  - Further technological advances and robotics

# Safe Kids Worldwide's AV Efforts

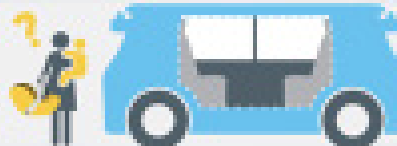


# Automated Vehicles: Consider Kids on the Road Ahead

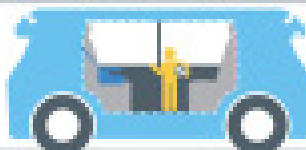
Child passengers need our help to stay safe, not just now, but in the future.



**ASAC** How will we ensure child restraints are compatible with new vehicle designs?

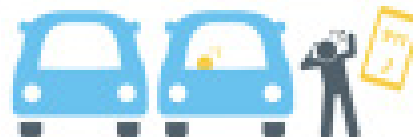


**ASAC** At what age can children ride safely alone in AVs?



**ASAC** Who will be responsible for buckling children up properly on every ride?

**ASAC** How will we ensure kids are supervised in case of emergency?



**ASAC** Are there risks to children in and around parked autonomous vehicles?

# Currently in Use for Real-World Testing

## Identifying the Waymo Fully Self-Driving Vehicle

The Waymo fully self-driving Chrysler Pacifica Hybrid minivans can be easily identified by the white color with Waymo logos, roof assembly, front fender additions, or rear roof additions below.

**During driverless testing and operation, Waymo's vehicles are fully self-driving at all times, and will not have any person in the driver's seat either steering or otherwise controlling the vehicle.**





# “Self-driving Shuttles” Also Being Tested



Shown: Zoox bi-directional shuttle

# Interior: Seating Possibilities



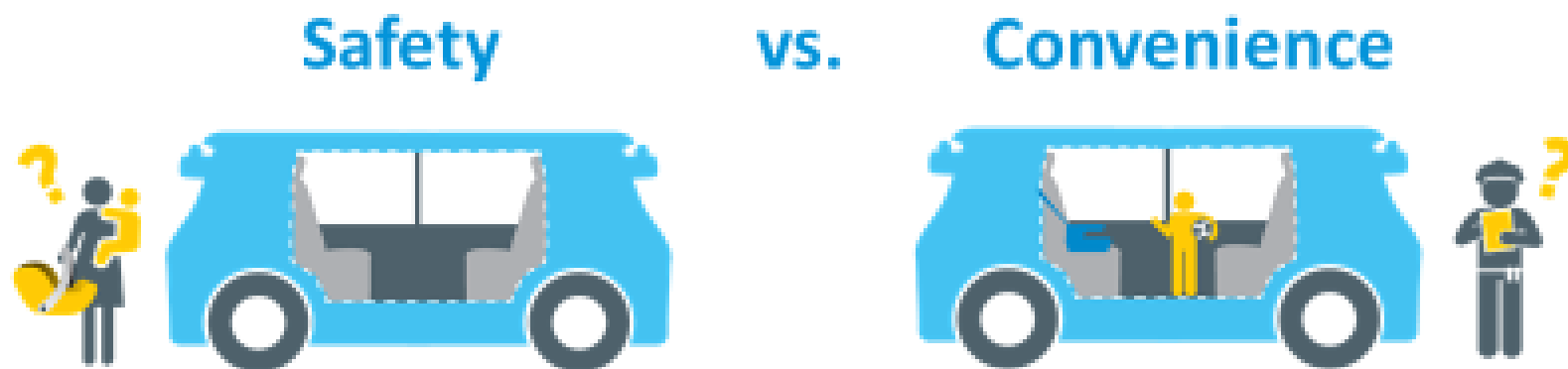
# Children Must Be Supervised for Safety

- Current vehicles and laws make the driver or attending parent responsible for child safety
- Who is responsible when the potential exists for no parent/caregiver to be present or alert?
  - children may unbuckle themselves or others
  - bored children may play unsafely with unused seat belts
- What is the appropriate age when a child can ride alone?

**Children under 13 must not be transported without appropriate adult supervision.**

# AV: Time Efficiency Discussion

- What are some potential benefits to families being “driven” compared with an adult needing to drive?
- What are some of the related safety considerations?



# EMS Possibilities

## Fewer crashes and significant injury reduction

### Benefits for emergency vehicles

- Collision avoidance technologies
- Features for braking, parking, etc.
- Communicate with other vehicles
- Less divided attention for patients
- Rideshare for non-emergent transport



**Who is responsible for patient-care decisions?**

**Will any AV systems require special deactivation training?**

# Law Enforcement and AV

## Fewer crashes and significant injury reduction

- Human error crashes
- Distracted driver crashes
- Impaired driver crashes
- Officers multitask in patrol vehicles



**Did the driver assume emergency control in a Level 2 or 3 vehicle?**

**Who is responsible for crashes in vehicles with no driver?**

**Have laws been updated to include autonomous vehicles?**

# What do CPS Advocates Need to Know?

## Advocates play an important role in family education

- Restraint use for all
- Car seat selection, installation and use
- Air bag interaction and warnings
- Supervision for children under age 13



**Advocates can also play a role in state legislation.**

**Familiarity with basic vehicle features is important.**

**Vehicle owner's manuals and online resources must be consulted.**

# Safety Is Important for All Uses

## **Multiple User Vehicles Becoming More Common**

- Rideshare, rentals, shared vehicles
- Certain car seats are becoming more portable, lightweight
- Easy use, accessible instructions and dexterity are needed
- Labels—pictorial

## **Standardized, harmonized terms for a new field**

- 10 years ago, no one talked about GOOGLING, for example

## **Vehicle Differences – Cars, trucks, shuttles**

- Interior designs
- Swivel seats
- Number of rows and configurations



# Get Involved & Stay Updated

## Online Toolkit:

- Presentations
- Webinars
- Useful information
- Links to additional information sources
- [www.safekids.org/AVs](http://www.safekids.org/AVs)

## Join our Autonomous Vehicles Interest Group:

- New information will be communicated
- Opportunities for input
- Educational resources
- [www.safekids.org/AVs](http://www.safekids.org/AVs)



# Thank You

[www.safekids.org/AVs](http://www.safekids.org/AVs)