

# SAFETY IMPACTS OF ACTIVE SAFETY AND DRIVING AUTOMATION FEATURES

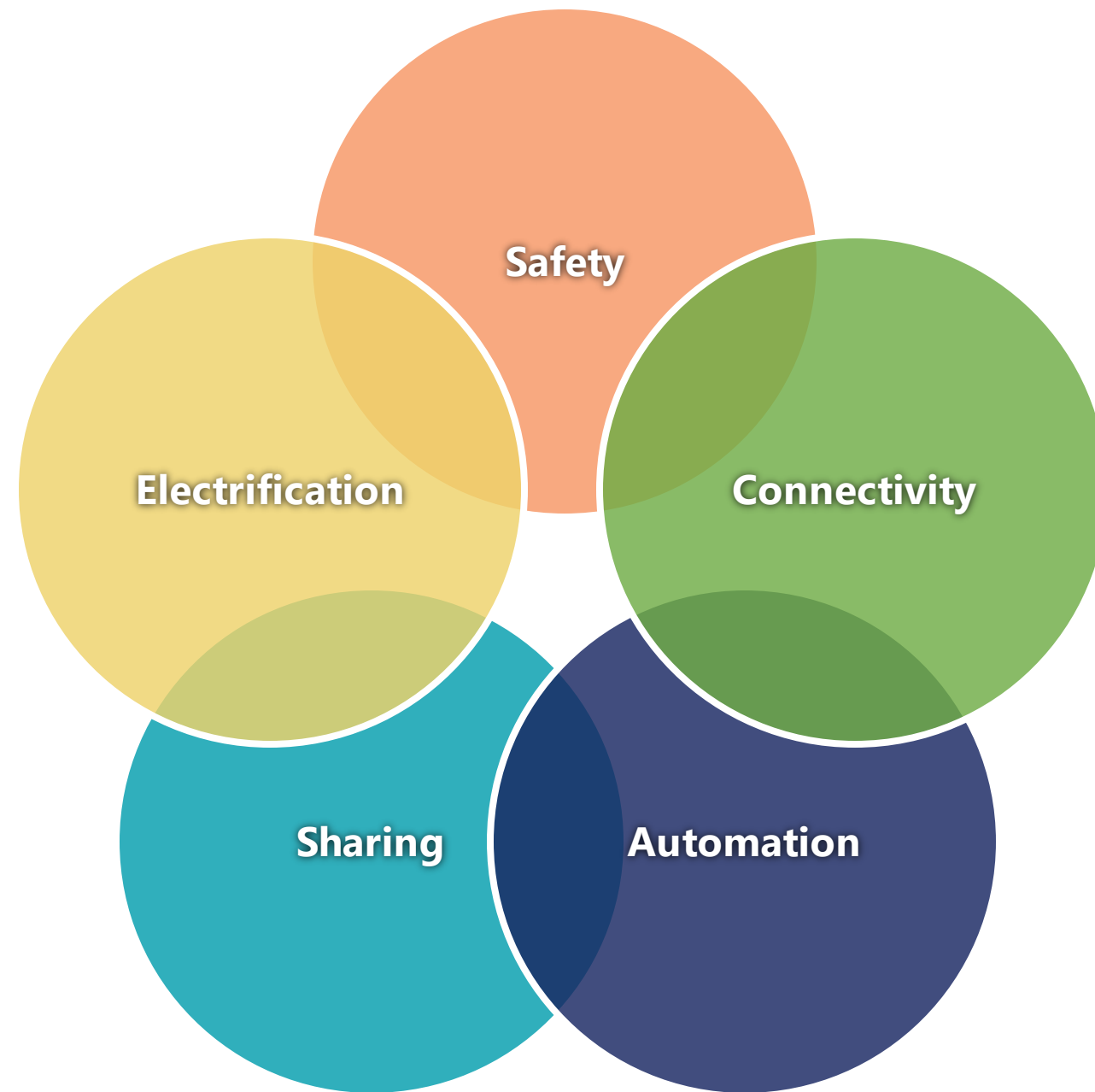
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# Trends – ACES<sup>2</sup>

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# Intro to Driving Automation and Active Safety

- Advanced safety features can be put in two categories:
  - Active Safety: Features that aid/supervise the human driver and operate/intervene intermittently when necessary for a safety-related reason.
    - Blind Spot Warning
    - Lane Departure Warning
    - Forward Collision Warning
    - Automatic Emergency Braking
  - Driving Automation: Features that perform all or part of the “dynamic driving task (DDT)” on a sustained basis.
    - The human driver is supervising the automation feature in L1/L2 and is not in L3-5\*\*.

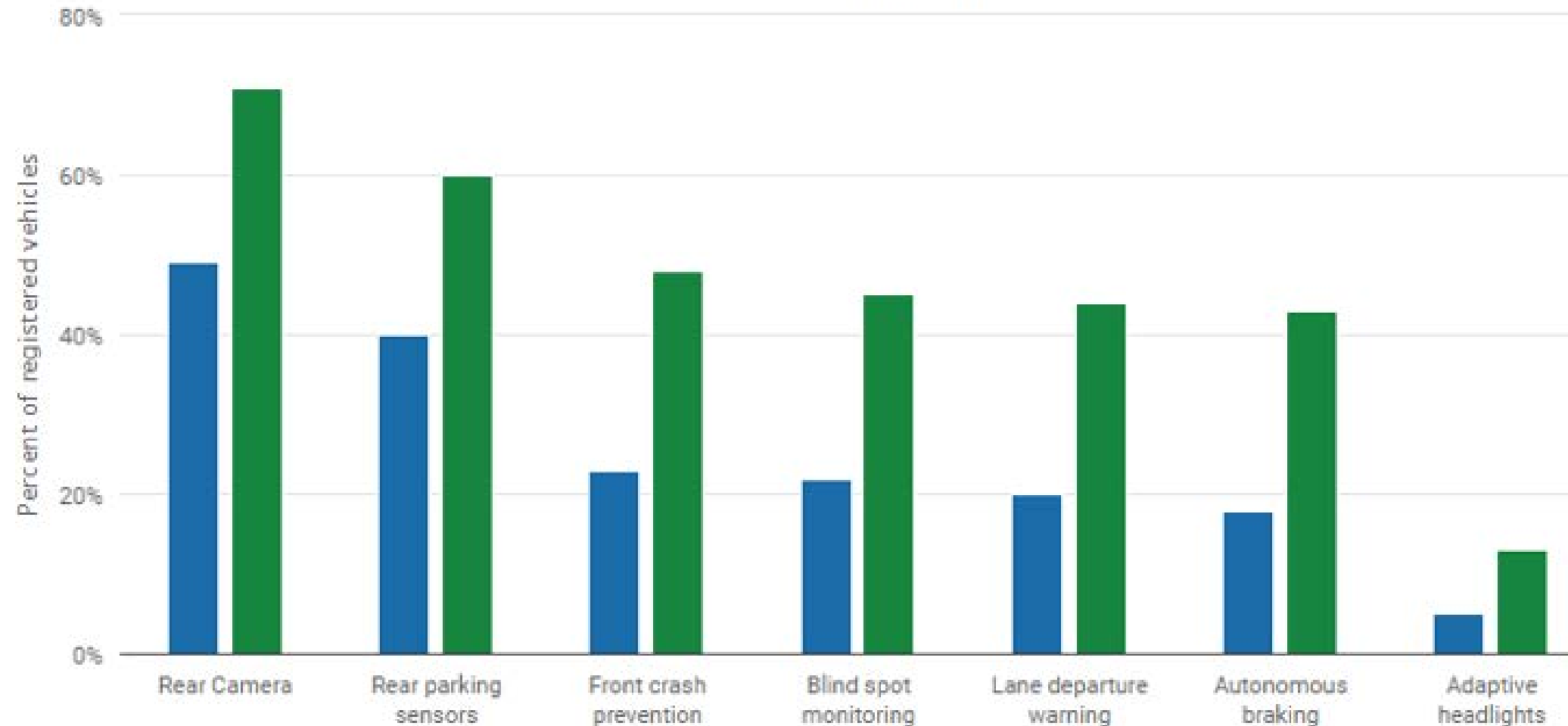


\*\* Drivers using a Level 3 feature need to be ready to intervene.

# Active Safety Feature Deployment

Estimated percentage of registered U.S. vehicles by Active Safety feature

2021 and 2026



Source: Highway Loss Data Institute/National Safety Council

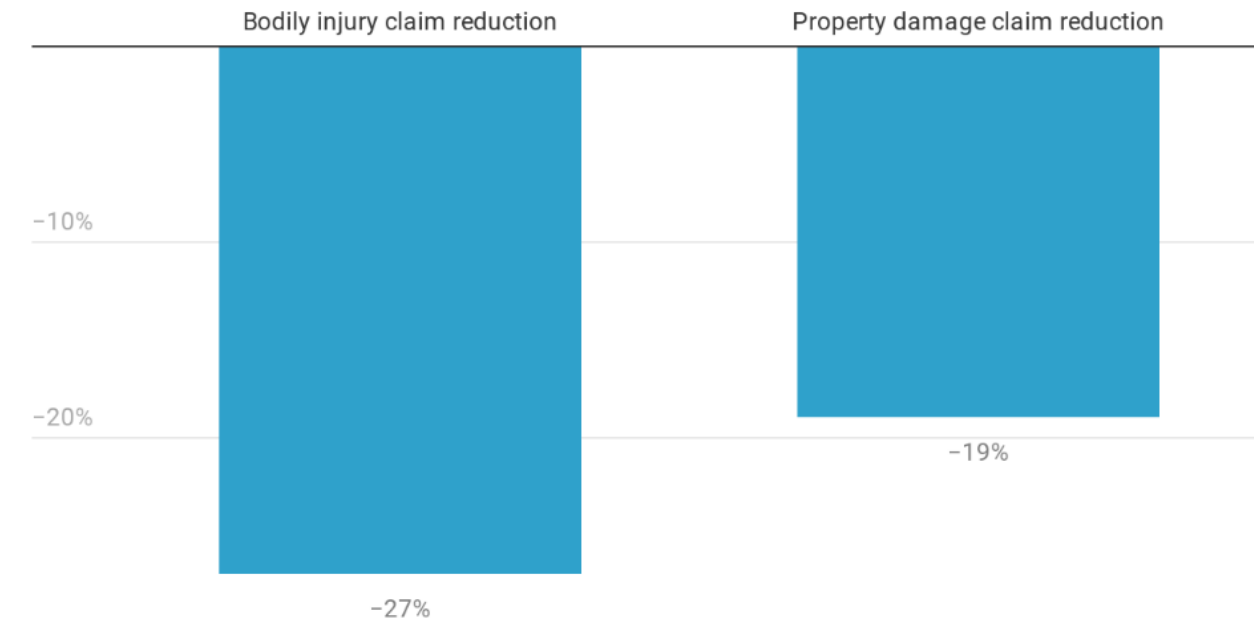
● 2020 ● 2026

- Note that “Front crash prevention” and “Autonomous braking” are more commonly known as “Forward Collision Warning (FCW)” and “Automatic Emergency Braking (AEB)”

# Active Safety Features – Safety Impacts

- Some Active Safety features have proven safety impacts.
  - In one 2022 study, FCW and AEB reduced Front-to-Rear collisions by 50%.
- Some regulation of active safety features:
  - Rear camera required in light-duty vehicles (LDVs).
  - AEB and ESC proposed for LDVs.
  - USDOT NCAP currently tests some Active Safety features, with proposal to add more.
    - Common metrics are needed.
- Users must understand the capabilities of active safety and not find them a nuisance.

## Reduction in Number of Insurance Claims for Vehicles with Active Safety Features



Source: LexisNexis Risk Solutions • Created with Datawrapper

# Driving Automation: SAE J3016 Levels



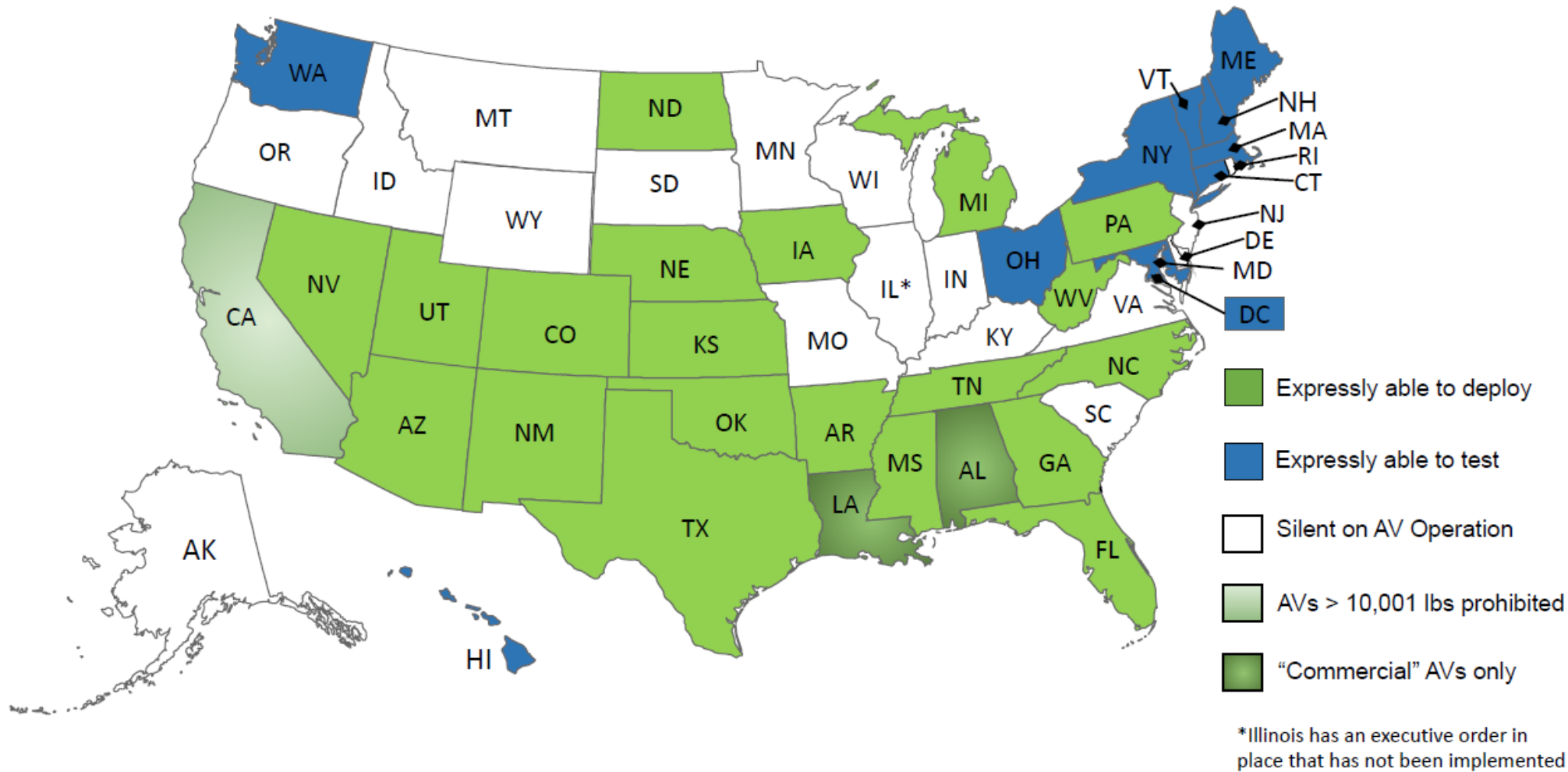
## SAE J3016™ LEVELS OF DRIVING AUTOMATION

	SAE LEVEL 0	SAE LEVEL 1	SAE LEVEL 2	SAE LEVEL 3	SAE LEVEL 4	SAE LEVEL 5
What does the human in the driver's seat have to do?	You are driving whenever these driver support features are engaged – even if your feet are off the pedals and you are not steering			You are <u>not</u> driving when these automated driving features are engaged – even if you are seated in “the driver’s seat”		
	You must constantly supervise these support features; you must steer, brake or accelerate as needed to maintain safety			When the feature requests, you must drive	These automated driving features will not require you to take over driving	
What do these features do?	These are driver support features			These are automated driving features		
	These features are limited to providing warnings and momentary assistance	These features provide steering OR brake/acceleration support to the driver	These features provide steering AND brake/acceleration support to the driver	These features can drive the vehicle under limited conditions and will not operate unless all required conditions are met	This feature can drive the vehicle under all conditions	
Example Features	<ul style="list-style-type: none"> <li>• automatic emergency braking</li> <li>• blind spot warning</li> <li>• lane departure warning</li> </ul>	<ul style="list-style-type: none"> <li>• lane centering OR</li> <li>• adaptive cruise control</li> </ul>	<ul style="list-style-type: none"> <li>• lane centering AND</li> <li>• adaptive cruise control at the same time</li> </ul>	<ul style="list-style-type: none"> <li>• traffic jam chauffeur</li> </ul>	<ul style="list-style-type: none"> <li>• local driverless taxi</li> <li>• pedals/steering wheel may or may not be installed</li> </ul>	<ul style="list-style-type: none"> <li>• same as level 4, but feature can drive everywhere in all conditions</li> </ul>

For a more complete description, please download a free copy of SAE J3016: [https://www.sae.org/standards/content/J3016\\_201806/](https://www.sae.org/standards/content/J3016_201806/)

# U.S. Driving Automation Regulation

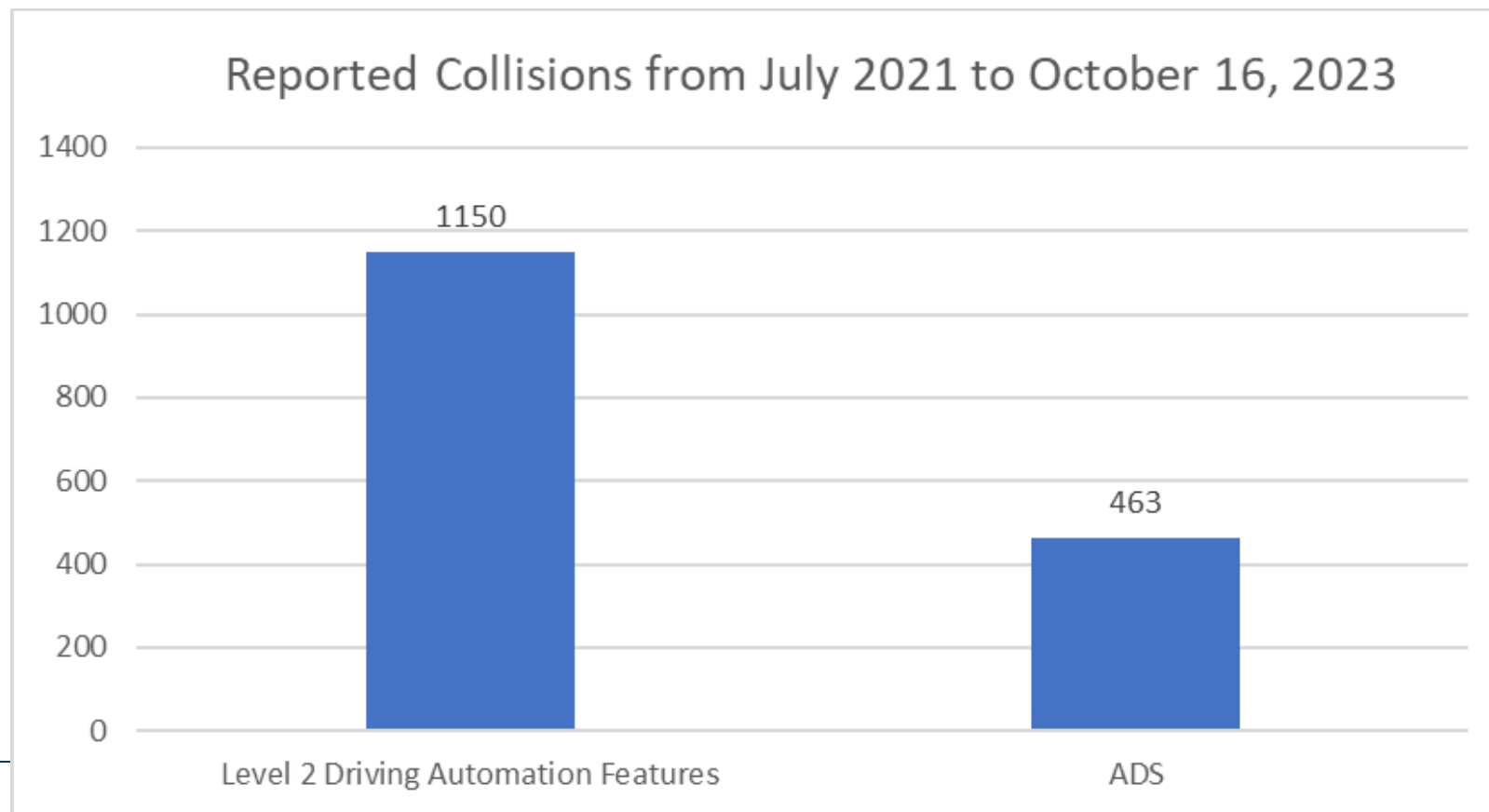
## U.S. State AV Laws & Regulations



- No federal regulations beyond FMVSS and SGO on collision reporting.
- Some states have more nuance to their regulation
  - For example, CA requires disengagements to be reported per VMT

# Driving Automation Features – Safety Impacts

- The safety impacts of driving automation features are still unclear.
  - Level 2 features (Autopilot/FSD, SuperCruise, BlueCruise, etc.) have varying capabilities related to the “object and event detection and response (OEDR)”.
  - Robotaxis have experienced a variety issues but there have been white papers that do provide some evidence of a positive safety impact.



- 25 Level 2 Driving Automation collisions in AZ
- 68 ADS collisions in AZ



# Driving Automation Features – Safety Impacts

- Difficult to fully determine safety impacts because of:
  - Low vehicle miles traveled (VMT) and no data on collisions per VMT
    - Human drivers have ~80 injuries and ~1.2 fatalities per 100M VMT on average
  - Different operating conditions
  - Unknown circumstances
  - Unreported collisions
  - Few other data shared
- We need to answer “how safe is safe enough?”. This is more nuanced than just collisions/injuries/fatalities per 100M VMT
  - Best human drivers approach 0.1 fatalities per 100M VMT
  - Are the new collision participants different?
- Challenge is to determine the safety impact of driving automation features before they are driving everywhere in all conditions and for 100Ms of miles.

# Driving Automation and Active Safety: Key Points

- Nomenclature usage is inconsistent
  - Beware the dreaded “ADAS” and “autonomous” terms (these are specifically deprecated in SAE J3016)
- Widely varying (and largely unclear) impact on safety by feature type and by manufacturer.
  - Human-Machine Interaction (HMI)
- Widely varying levels of consumer understanding, approval, and usage.
- Very little regulation
  - Balance between public safety vs. innovation
- Fleet turnover
- **Active safety and driving automation features are useful tools to improve road safety, but still much work to be done.**

# Thank You

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