Transportation is Advancing Rapidly, Will Commercial Insurance Keep Up the Pace?

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Bios and Introduction

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AUTOMATED VEHICLE
PROVING GROUNDS

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Overview

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Background

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The next 15 years in transportation will be more transformative than any time in our history

- Highly automated vehicles will begin to enter and disrupt the market
- Downtown cores and interstates will be the first movers
- Crashes will decrease and the types of crashes in the mix will change
- The transition offers many challenges and unanswered questions



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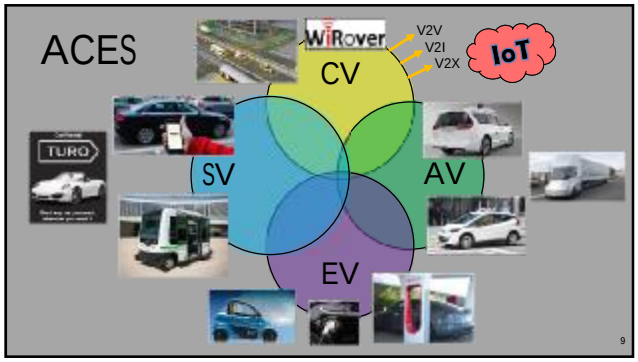

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Advanced Driver-Assistance Systems (ADAS)

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SAE Levels of Vehicle Automation

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Connected Vehicles – Overview

- **Vehicle-to-Vehicle (V2V)**
- **Vehicle-to-Infrastructure (V2I)**
- **Vehicle-to-Anything (V2X)**
  - **Pedestrians**
  - **Bicycles / motorcycles / mopeds**
- **Connected everything – Internet of Things**
- **Basic Safety Messages (BSM) broadcast every 1/10th of a second**
  - **Vehicle position, speed, heading, acceleration, size, brake system status**
- **Vehicles and infrastructure need to be equipped to gain benefit**

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ACES and the Future of Transportation

Vehicle to Infrastructure Communications
Red Signal Runner at Intersection Warning

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ACES and the Future of Transportation

Vehicle to Vehicle Communications
Road Hazard Notification

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ACES and the Future of Transportation

Vehicle to Anything Communications
Turning Crosswalk Pedestrian Warning

Source: NYC CV Pilot

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ACES and the Future of Transportation

Connected Vehicle Applications

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ACES and the Future of Transportation

Where is the AV research happening in the US?

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ACES and the Future of Transportation

Where is the CV research happening in the US?

As of August 10, 2020

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CAV Use Cases

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CAV Use Cases: Shared Mobility

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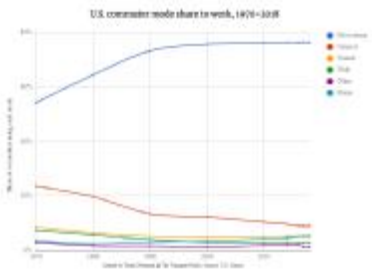
Personal Mobility Choices

The rise of the SOV (single-occupant vehicle)



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Why do people prefer personal mobility?

- Instant availability
- Point-to-point direct access
- Personal accoutrements
- Perception of time savings / actual time savings
- Perception of cost savings / actual cost savings
- Perception of increased safety / actually safer
- They've always done it that way

- To key to improve usage of shared mobility
  - more options need to be available

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Shared Mobility Options

- Traditional sharing – public transit (bus/rail), taxi cabs
- Car sharing – Zipcar, car2go
- TNCs (Transportation Network Companies) – Uber, Lyft
- New business models – Turo, taxi apps
- New vehicles – automated microtransit, Hyperloop, delivery bots
- Complementary modes – Scooters, e-bikes, moped, bike share




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Mobility as a Service (MaaS)

- Single payment system for multiple modes
- Applications compare fastest/cheapest routes
- Automated fare systems
- Integration of private transit modes
- Incentives for car sharing
- Complete trip integration


Source: APTA

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CAV Use Cases: Shuttles

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Automated Shuttles – An Overview



- **Low-speed shuttles and autonomous neighborhood electric vehicles (NEVs)**
  - **First/last mile routes**
  - **Neighborhood routes**
  - **Campus routes**
- **High-speed shuttle busses**
  - **Community routes**
  - **Local deliveries**
- **Fixed or on demand service**

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WiscAV ACES Shuttle – Project Vision

Execute → Inspire → Organize → Explore

Execute: Deploy shuttle safely and visibly

Inspire: Engage community and invigorate entrepreneurial endeavors

Organize: Catalyze R&D in automated and connected vehicles

Explore: Collect and translate data into meaningful information

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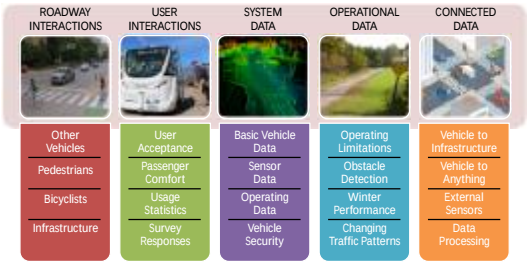
Operational Plans – Safety and Mobility Data



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Wisconsin Shuttle Projects – Concepts to Reality

Routes
- Madison First/Last Mile Route
- UW-Madison Route
- Community/Technical College Routes
- Brown County AV Route(s)
- Racine CAV Project
- Southeast Aging and Disabled Transit

Vehicle Testing
- Integrating vehicles with transit (dynamic routing)
- Closed course scenario testing and standards development
- High speed AVs on freeways, rural two-lane arterials
- Data collection and analysis

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Madison Shuttle Project – Who's Involved?

- City of Madison
  - Department of Transportation (Traffic Eng., Parking Utility, Metro Transit)
  - Mayor's Office
  - Office of Business Resources / Economic Development
  - Madison Transportation Commission
  - Citizens (Alders, Neighborhood Associations)
- UW-Madison
  - Engineering (Civil and Environmental, Mechanical, Electrical, Industrial Systems)
  - Planning
  - Computer Science
  - Design Innovation Lab
  - Administrators (Transportation Services, UWPD, Community Relations, Risk Management, Corporate Relations, Legal)
- Public/Non-Profit
  - Downtown Madison, Inc.
  - Madison Central BID
  - Greater Madison Chamber of Commerce
  - Dane County and RSVP of Dane County
  - Greater Wisconsin Agency on Aging Resources
  - Wisconsin Rural Partners
  - WisDOT, WSP, Wisconsin DMV
- Industry
  - CapEast Businesses (Festival Foods, Gebhardt, Brink, Big Top Sports, Old Sugar Distillery, Bos Meadery)
  - American Family Insurance
  - Madison Gas and Electric
  - AVPG Test Tracks (MGA, Road America)
  - Others (Green Cab, Schmidt's Towing, Mandli, Continental Mapping, Epic, TAPCO, local entrepreneurs)

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Engaging Stakeholders

- User Acceptance
  - Community demonstrations
  - Vulnerable road users
  - Equitable access
  - Outreach/Public Reaction
- Law enforcement and traffic records data needs
- Registration / licensing / insurance
- Transit integration / training
- City and state data needs

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CAV Use Cases: Trucking

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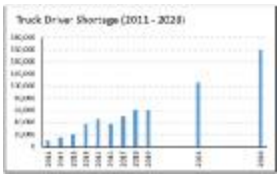
Trucking Industry Today

- Trucks move **71.4% of all freight** tonnage in the U.S.
- Freight volumes have continued to rise since the Great Recession
- **Median driver age is 47** in trucking industry, compared to 42 for all industries
- Shortage of drivers for last 15 years
  - 2018: **60,800 drivers short**
  - 2028: projected **shortage of 160,000**
- Shortage is amplified by the struggle to find qualified drivers
- Causes of Shortage
  - Driver Demographics – Age
  - Lifestyle – Extended Periods Away
  - Job Alternatives



Source: American Trucking Associations / BLS

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Key Milestones

Global

April 2016

Intrastate

October 2016

Interstate

February 2018

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Key Milestones Since Then

Look No Hands

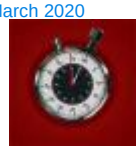
June 2019

Long Haul

November 2019

Wider Audience

March 2020



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Platooning

- Maintain distance via wireless communication, radar, and GPS
- Primarily performs "straight-line" adjustments
- Alert driver is still needed, especially for direction changing maneuvers
- 5-10% reduction in fuel cost, can be more or less depending on length

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Platooning

Pros
- Fuel savings
- Less roadway congestion
- Reduced accidents

Cons
- Multiple truck accidents
- Prevent other vehicles from changing lanes
- Wireless communications could be compromised

Photo: The Verge

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Retrofit / After-Market Sensors

Photo: Business Insider

Otto's Retrofit Kit included:
- 3 LiDAR units
- Radar
- High-precision camera(s)
- Power steering
- Braking system
- GPS / Mapping data
- Custom computer

Apply to any truck built after 2013

Estimated Price: ?

Source: Wired

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Retrofit / After-Market Sensors

Pros
- Utilize current fleet
- Less frequent stops
- Driver is able to multi-task
- Maybe attract more drivers

Cons
- Risk of software failure
- Not enough real-world testing yet
- May end up costing more than initially anticipated

Photo: Wired

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Originally Manufactured

Pros
- Theoretically more reliable
- Less frequent stops
- Driver is able to multi-task or even be removed from cab
- Possibility for electric

Photos: AutoBlog / Forbes

Cons
- Risk of software failure
- Mostly conceptual / Limited on-road testing
- Could be very costly

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Players in the Autonomous Truck Realm

TuSimple, EMBARK, TESLA, VOLVO, plus.ai, Phantom Auto, EINRIDE, WAYMO, DAIMLER

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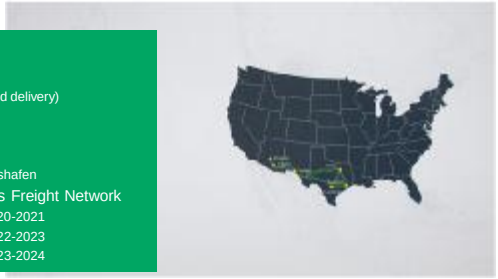
Recent Developments

TuSimple

- Partners
  - UPS
  - USPS
  - McLane (food delivery)
  - U.S. Xpress
  - Navistar
  - Penske
  - ZF Friedrichshafen
- Autonomous Freight Network
  - Phase 1: 2020-2021
  - Phase 2: 2022-2023
  - Phase 3: 2023-2024



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Risks and Insurance

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Lines of Business Affected by CAV

1. Commercial Auto
2. General Liability
3. Workers' Compensation
4. Inland Marine
5. Cyber

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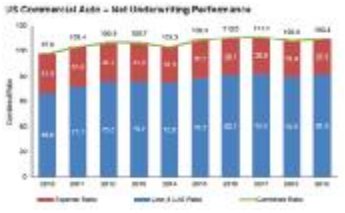
Commercial Auto

- Deterioration driven by
  - Nuclear verdicts
  - Distracted driving
  - Inadequate safety precautions
  - Slow to adapt current tech and modeling techniques
- Loss adjustment expense growth due to costlier litigation
- Litigation is a serious concern
  - Social inflation
  - Litigation financing



Source: AM Best

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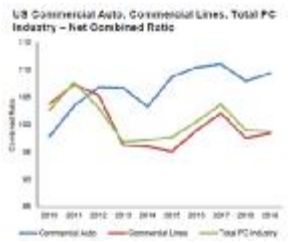
Commercial Auto



Source: AM Best

- Compounded rate increases in recent years (some carriers had consecutive double digit increases)
- COVID impact
  - Exposure change depends on industry
  - Less traffic = Lower Freq, Higher Sev
- Focus on implementing technology to help monitor driving and increase efficiency
  - **TELEMATICS IS KEY!**

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Commercial Auto

- Driver error causes about 90% of crashes
  - Roughly 70% in the case of trucks
- About 4,136 people died in large truck crashes in 2018
  - 67% were passenger vehicles occupants
  - 16% were large truck occupants
- Driver fatigue is often a contributor
  - Federal hours-of-service regulations restrict the time on the road
  - Surveys indicate some drivers violate this
- Loaded trucks go 20-40% farther than cars when braking

Source: Insurance Institute for Highway Safety

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Commercial Auto w/ CAV

- Driver error causes about 90% of crashes +Reduced but not eliminated (1/3)
  - Roughly 70% in the case of trucks
- About 4,136 people died in large truck crashes in 2018 +Less crashes?
  - 67% were passenger vehicles occupants
  - 16% were large truck occupants +Driver may not be in cab or in a safer position
- Driver fatigue is often a contributor +Driver could rest in cab (level 4+)
  - Federal hours-of-service regulations restrict the time on the road
  - Surveys indicate some drivers violate this
- Loaded trucks go 20-40% farther than cars when braking +Quicker response

-Cyberattacks on moving vehicles causing crashes, Terrorism

Source: Insurance Institute for Highway Safety

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Commercial Auto

- 5,977 pedestrians died in vehicle crashes in 2017
  - Estimated that an additional 137,000 sent to emergency room
  - 1.5 times more likely to be killed in car crash than passengers
- 47% of pedestrian deaths involved alcohol
  - 17% driver is >.08 BAC
  - 33% pedestrian is >.08 BAC
- Typical characteristics of pedestrian accidents
  - Urban areas
  - Non-intersection
  - Night

Source: CDC / NHTSA

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Commercial Auto w/ CAV

- 5,977 pedestrians died in vehicle crashes in 2017 +Less pedestrians hit?
  - Estimated that an additional 137,000 sent to emergency room
  - 1.5 times more likely to be killed in car crash than passengers
- 47% of pedestrian deaths involved alcohol
  - 17% driver is >.08 BAC +AV can't drink
  - 33% pedestrian is >.08 BAC –AV may have difficulty predicting irregular behavior
- Typical characteristics of pedestrian accidents
  - Urban areas +Likely see CV advancements sooner
  - Non-intersection –Irregular behavior
  - Night –Visibility concerns

Source: CDC / NHTSA

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General Liability

Product

Premise

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General Liability w/ CAV

Product

Premise

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Workers' Compensation

- Injury from vehicle accidents
- Repetitive motion injury
  - Long hours spent in the same position
- Lifting/Overexertion injuries when loading and unloading cargo
  - Improper lifting form, fatigue, and rushing are all contributors

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Workers' Compensation w/ CAV

- Injury from vehicle accidents +Less frequent, less severe
- Repetitive motion injury
  - Long hours spent in the same position +Driverless for long highway segments
    +Possibly able to move around?
- Lifting/Overexertion injuries when loading and unloading cargo
  - Improper lifting form, fatigue, and rushing are all contributors +Driver could rest
    +More likely to be on time
    +No driver for low speed

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Inland Marine

Picture: XtraLease

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Inland Marine

- FBI estimates that $15-$30 billion of cargo is stolen every year
  - Average shipment value stolen is around $200,000
- Most theft occurs within the first 4 hours of a route
- Areas around certain cities and highways are particularly vulnerable
- Many instances of theft committed by drivers

Source: XtraLease / XL Catlin

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Inland Marine w/ CAV

- FBI estimates that $15-$30 billion of cargo is stolen every year
  - Average shipment value stolen is around $200,000
- Most theft occurs within the first 4 hours of a route +Guarantee a 4+ hour start
- Areas around certain cities and highways are particularly vulnerable
  +Easier to continue driving through high risk areas
- Many instances of theft committed by drivers
  +Driverless segments, more external monitoring

-Digital piracy

-Driverless delivery targeted

Source: XtraLease / XL Catlin

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Cyber

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Cyber w/ CAV

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Insuring Autonomous Vehicles

- Some manufacturers have announced that they will accept responsibility for accidents due to malfunction
  - Generally seem to be self-insuring this risk due to lack of coverage options
- At least one insurer has explicitly said that it is willing to write policies for autonomous vehicles (AXA XL), others have policies in the works
  - Could include liability, property damage, theft, cyber, care/custody/control, and business interruption
- Manufacturers have shown interest in creating their own auto insurance programs
  - Could help sell AV with limited insurance options

Source: AXA XL

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Insuring Autonomous Vehicles

- Changes in underwriting and pricing strategies
  - Shift from focus on driver to focus on technology and maintenance
- Changes in policy language
  - Could lead to policy gaps if not careful
- Speculative Liability Structures
  - Status Quo & Subrogation / Product Liability First / Others
- New Boutique Insurance Products

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Insurance Complications

- Assignment of risk
  - Is the manufacturer liable? If so, which manufacturer (sensors, software, truck)?
  - Determining percentage of driver error?
  - Was the vehicle properly maintained leading up to the accident?
- Lack of data
- Lack of available coverage
- Structure of Liability
  - Status Quo & Subrogation
  - Product Liability First

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Implementation

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Benefits of ACES / CAVs

- Connected Vehicles (CVs)
  - Less time spent stopped at signals
  - Enhanced safety at intersections, in work zones, and in adverse weather
  - Reduced congestion without building more roads
- Advanced Driver Assistance Systems (ADAS)
  - Increased safety of specific driving tasks
  - Increased fuel efficiency / reduced emissions
- Automated Vehicles
  - Time freed from driving task for other tasks such as work, interaction with passengers, viewing scenery, sleep, etc.
  - Vehicle sharing increases / ownership not as necessary
  - Mobility options for those currently unable to drive
  - Decreased congestion?

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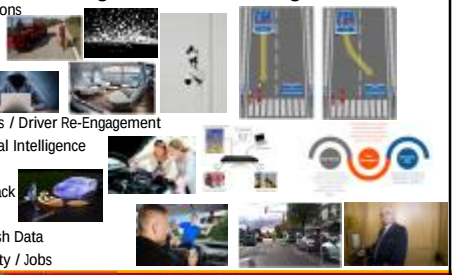
Largest Challenges Surrounding AV/CV

- Complex Driving Situations
- Vehicle Cybersecurity
- Information Privacy
- Vehicle Ethics
- Crashworthiness
- System Disengagements / Driver Re-Engagement
- Deep Learning / Artificial Intelligence
- Vehicle Assertiveness
- Fault Tolerance / Fall Back
- Vehicle Maintenance
- Liability / Legality / Crash Data
- User Acceptance / Equity / Jobs



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Breadth and Complexity of AV R&D

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Government Oversight of CAVs

- International Standards (ISO, Country Conventions, etc.)
- Federal (USDOT, NHTSA, FHWA, Congress)
  - Federal Motor Vehicle Safety Standards (FMVSS)
  - Ensuring American Leadership in Automated Vehicle Technologies Automated Vehicles 4.0
  - Various congressional acts
- State
  - Wide range of ambiguous/outdated statutes
  - Vehicle registration
  - California safety reporting
- Local
  - AVs on city/municipal roads
  - Neighborhood associations / wards
- Other
  - University, corporate, etc.

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Current AV Legislation

States with Autonomous Vehicle Legislation

Legend: Green – Legal
Orange – Legal w/ Safety Driver
Blue – No Legislation

States that Authorize Vehicle Platooning

Legend: Red – No exemptions for platooning vehicles
Yellow – Some authorization w/ restrictions
Green – Full authorization of platooning

Photos: Lifewire / CEI

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(An) AV Timeline

- 2015 • driver assistance common • some partial automation available to consumers
- 2020 • limited / conditional AVs widely available to consumers
- 2025 • autonomous shared mobility fleets are common
- 2030 • high automation required in all new vehicles
- 2040 • human operation is the exception in many places
- 2060 • transition to driverless largely complete • fleet turnover continues…
- 2100

- Any estimate is debatable
- We are only at the beginning of a long transition period

2063?

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Conclusions

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Conclusions

- The next 15 years in transportation will be more transformative than any time in our history
- Not just Personal! – Commercial uses like TNCs, shuttles, and trucking are gaining traction
- Not just Auto! – It will see a significant impact, but will not be the only LoB affected by CAV
- Insurance response is in early stages and will likely be a key piece
- Opportunities still exist to influence future insurance structures
- Benefits in safety and convenience are increasing the desire to adopt CAV
- Keep this on your radar, wide-scale implementation is closer than it seems

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Questions

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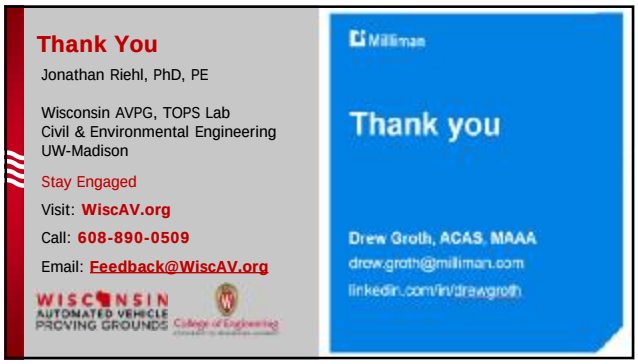
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