# The Road to Automation from an Insurance Perspective

#### CAS Spring Meeting May 10, 2023



Kay Wakeman Director of Insurance Outreach



## Saving lives. Preventing harm.

#### **IIHS-HLDI** mission:

To reduce deaths, injuries and property damage from motor vehicle crashes through **research and evaluation** and through **education** of consumers, policymakers and safety professionals.

#### Member groups

#### IIHS and HLDI are wholly supported by these auto insurers and insurance associations

Acceptance Insurance Acuity Insurance Allstate Insurance Group AmericanAg American Family Insurance American National Amica Mutual Insurance Company AssuranceAmerica Auto Club Enterprises Auto Club Group Auto-Owners Insurance Celina Insurance Group CHUBB The Cincinnati Insurance Companies Colorado Farm Bureau Insurance Company Commonwealth Casualty Company Concord Group Insurance CONNECT, powered by American Family Insurance Cooperators Financial Services Limited **COUNTRY Financial** CSAA Insurance Group CSE Insurance Group Desjardins Insurance Donegal Insurance Group

DTRIC Insurance ECM Insurance Group **Elephant Insurance Company** EMC Insurance Group Encova Insurance Erie Insurance Group Farm Bureau Financial Services Farm Bureau Insurance Company of Michigan Farm Bureau Insurance of Tennessee Farm Bureau Mutual Insurance Company of Idaho Farmers Insurance Group Farmers Mutual of Nebraska Florida Farm Bureau Insurance Companies Frankenmuth Insurance Gainsco Insurance **GEICO** Corporation The General Insurance Georgia Farm Bureau Mutual Insurance Company Goodville Mutual Casualty Company Grange Insurance **Grinnell Mutual** Hallmark Financial Services, Inc. The Hanover Insurance Group

The Hartford Haulers Insurance Company, Inc. Horace Mann Insurance Companies Indiana Farm Bureau Insurance Indiana Farmers Insurance Just Auto Insurance Kemper Corporation Kentucky Farm Bureau Mutual **Insurance Companies** Liberty Mutual Insurance Louisiana Farm Bureau Insurance Company Main Street America Insurance MAPFRE Insurance Group Mercury Insurance Group Metromile Mississippi Farm Bureau Casualty Insurance Company MMG Insurance Munich Reinsurance America. Inc. Mutual Benefit Group® Mutual of Enumclaw Insurance Company National General Insurance Nationwide NJM Insurance Group Nodak Insurance Company

The Norfolk & Dedham Group<sup>®</sup> North Carolina Farm Bureau Mutual Insurance Company North Star Mutual Insurance Company Northern Neck Insurance Company NYCM Insurance Ohio Mutual Insurance Group Oregon Mutual Insurance Company PEMCO Mutual Insurance Company Plymouth Rock Assurance Progressive Insurance PURE Insurance **Qualitas Insurance Company Redpoint County Mutual Insurance** Company The Responsive Auto Insurance Company Rider Insurance **Rockingham Insurance** Root Insurance Co RSA Canada Safe Auto Insurance Company Safeco Insurance® Samsung Fire & Marine Insurance Company Say Insurance SECURA Insurance

Selective Insurance Sentry Insurance Shelter Insurance® Sompo International South Carolina Farm Bureau Mutual Insurance Company<sup>®</sup> Southern Farm Bureau Casualty Insurance Company State Auto Insurance Companies State Farm Insurance Companies Stillwater Insurance Group Swiss Reinsurance Company Ltd Texas Farm Bureau Insurance The Travelers Companies, Inc. USAA Virginia Farm Bureau Mutual Insurance West Bend Mutual Insurance Company Westfield

#### **Funding associations**

American Property Casualty Insurance Association National Association of Mutual Insurance Companies

Results pooled across automakers



Results pooled across automakers



Results pooled across automakers



Results pooled across automakers



Results pooled across automakers



Results pooled across automakers



#### Most crash avoidance technologies are living up to expectations

Effects on relevant police-reported crash types



# Analysis of ADAS bundles using engine-level feature data



#### Summary of technology bundles

#### Change in claim frequency



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## Estimated changes in injury-related claim frequency associated with ADAS bundles



## Estimated changes in physical damage claim severity associated with ADAS bundles



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## Estimated changes in physical damage overall losses associated with ADAS bundles



## **AEB test track evaluations**



## Front AEB testing

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#### Front crash prevention ratings

2013-23 models



### **20 automakers**

(99+% of the U.S. market) have committed to making autobrake standard by September 2022



## Next steps



#### Proportion of rear-end crashes by type of striking vehicle



#### Speed limit in police-reported rear-end crashes

#### Calendar years 2016-19



#### Struck vehicle type in police-reported rear-end crashes





## AEB and pedestrians, cyclists, and animals



### U.S. pedestrian fatalities

1975-2021





## Effects of pedestrian automatic emergency braking (AEB) on police-reported pedestrian crashes





#### Effects of Subaru EyeSight generations 1 and 2 on bike crashes By configuration



#### Subaru EyeSight and change in BI-only claim frequency

BI claims with no associated vehicle damage claims



#### Animal strike claims

2006-20



### Animal strike claim frequency for Subaru collision avoidance features

2013-21 model years





## Evaluations of Level 2 systems



#### Changes in frequency with Nissan front crash prevention system

April 2021 analysis of 2017-19 Nissan Rogue



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#### Changes in claim frequency with BMW front crash prevention

December 2021 analysis of model years 2013-17



#### 2018-20 Cadillac CT6 Super Cruise bundle changes in loss results

#### Through calendar year 2021


#### Subaru EyeSight 2<sup>nd</sup> generation, v3++ only

Percent change in claim frequency, by coverage type



## Changes in claim frequency with Audi Traffic Jam Assist

#### Analysis of 2017 Q7 and A4



#### Distribution of PDL claims, 2020 calendar year

By claim size and vehicle type, 1981-2021 models



## Tesla Model 3



# Proportion of vehicles with turbo/supercharged, hybrid or electric powertrains in 2021

By model year

Turbo/supercharged Hybrids Electrics



#### Actual vs. predicted proportion of vehicle registrations

By engine type and calendar year



#### VIN counts for 2018-19 electric vehicles

By series, as of May 2022



### VIN counts for 2018-19 midsize luxury four-door vehicles

By make, as of May 2022



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#### **Estimated differences in claim frequency**

2018-2019 Tesla Model 3 vs. different control groups



#### **Estimated differences in claim frequency**

2019 Tesla Model 3 vs. different control groups, data since 4/11/2019



## How drivers use automation



#### **Advanced Vehicle Technology Consortium**

Volunteer adult drivers from Boston metro area



2017 Volvo S90

Pilot Assist (partial driving automation)



2016 Land Rover Range Rover Evoque Adaptive cruise control (ACC)

#### Use of driving automation by system and road type



#### Percent of time ACC was used

Land Rover Range Rover Evoque on interstates and freeways



#### Percent of time Pilot Assist or ACC was used

Volvo S90 on interstates and freeways



#### Adaptive cruise control and Pilot Assist speeds cluster every 5 mph

On interstates and freeways



#### **Drivers sped more frequently with ACC and Pilot Assist**

Percent of time speeding



#### **Drivers went faster with ACC and Pilot Assist**

Miles per hour over the limit on 55 mph roads

Tool RES CNCL	7   mph	mph	9 mph	
	Manual control	ACC	Pilot Assist	

#### Driver disengagement study: hands-off-wheel and distraction during a 4-week field trial



#### Percent of time Volvo S90 participants were disengaged from driving



#### Percent of time Volvo S90 participants with both hands off wheel



#### Percent of time Volvo S90 participants manipulating phone



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# Public appetite for partial driving automation



#### **Preferred lane centering assistance type**



#### Preferred auto lane change type



# Percentage of drivers reporting to be at least somewhat comfortable with different types of driver monitoring



#### Percentage of drivers who feel safer knowing vehicle is monitoring them

By lane centering assistance preference





# Safeguard rating components

- 1. Driver monitoring
- 2. Attention reminders
- 3. Emergency escalation
- 4. Automated lane change
- 5. ACC auto-resume
- 6. Cooperative steering
- 7. Safety features



# Phase-in of collision avoidance systems



#### New vehicle series with adaptive cruise control with lane centering By model year



#### Registered vehicles with adaptive cruise control with lane centering By calendar year



## Predicted percentage of registered vehicles with adaptive cruise control with lane centering

By calendar year



#### **Estimated registered vehicles by feature**

#### Calendar years 2021 and 2026



## **CAS Capability Model**

Content **Traits** Areas Skills

Visual framework that articulates and provides guidance on the traits, skills and knowledge important for most property/casualty actuaries

> Use the model to self-assess your levels of professional attributes in 18 different areas

Then identify areas of opportunity to learn and grow and plan your professional development journey



## **CAS Capability Model**



## **Content Area**

### **Property & Casualty Insurance Industry**

Knowledge of industry operations (e.g. contracts, underwriting, and the regulatory environment)

- Levels of automation
- Makeup of the vehicle fleet
- Impact of electric vehicles


# CAS Capability Model

#### Level 1:

Industry operations, including how the actuarial function influences processes and regulations applicable to one's practice.

#### Level 2:

The property and casualty industry environment, including laws and regulations applicable to practice, as well as any imminent changes that may impact practice.

## Level 2

P&C industry environment applicable to practice

- Private Passenger Auto
- Commercial Auto

### Level 3:

Emerging trends in the industry relevant to one's practice area and role and demonstrate thought leadership in predicting the impact of these emerging trends.



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Kay Wakeman Director of Insurance Outreach kwakeman@hldi.org

