Human and Mobility Impacts of Autonomous Vehicles

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Technology Takes the Wheel
Autonomous Vehicle Seminar Series

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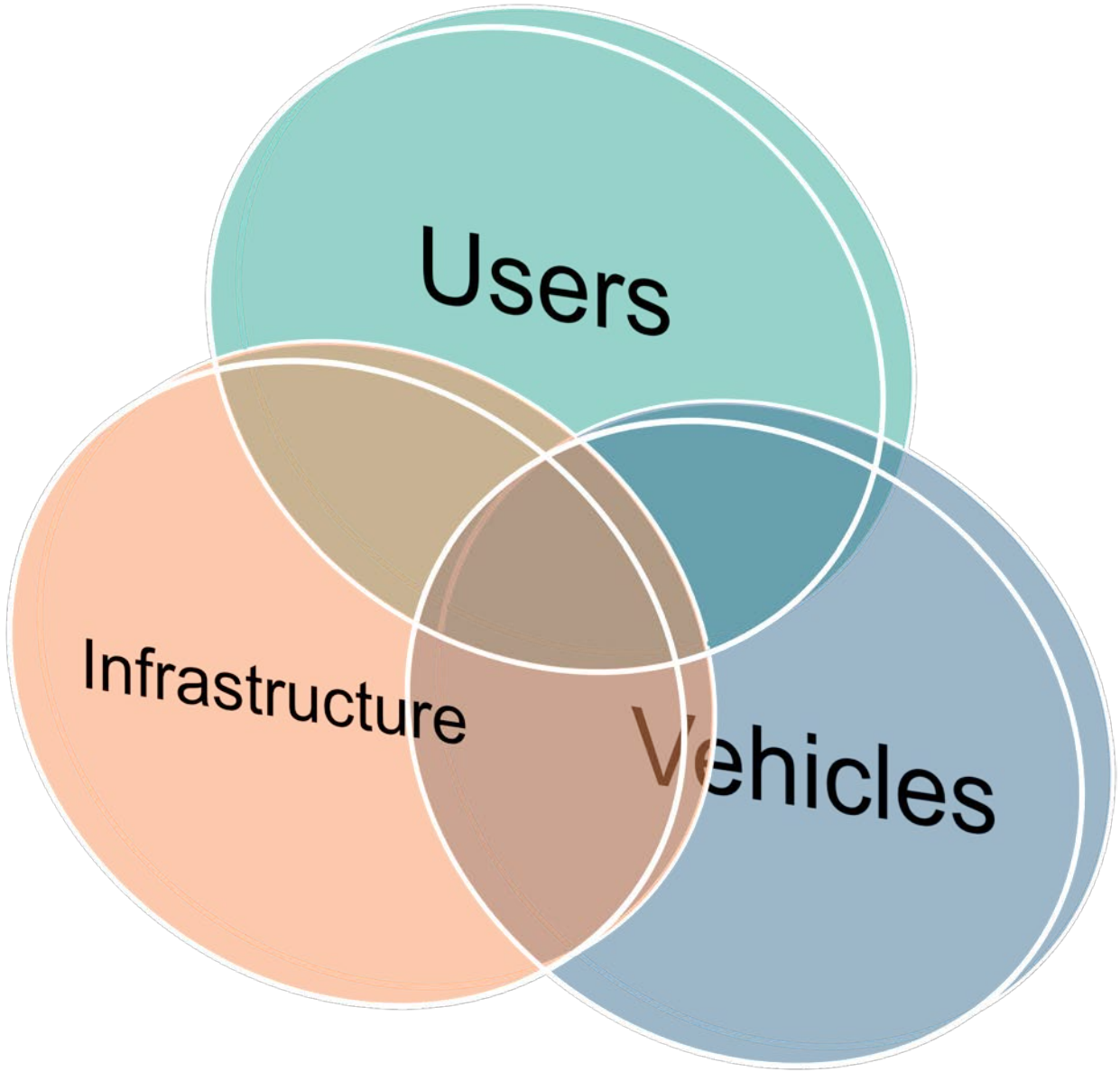
Harmonize Components of Transportation System



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Research Focus Areas

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EMERGING TECHNOLOGIES

Research Topics

- User Expectation
- User Acceptance
- User Experience
- Safety Benefits

Technical Documents

Collaboration

https://www.orioninfosolutions.com/

Cultivating Connection

Assessing innovation beyond the dashboard

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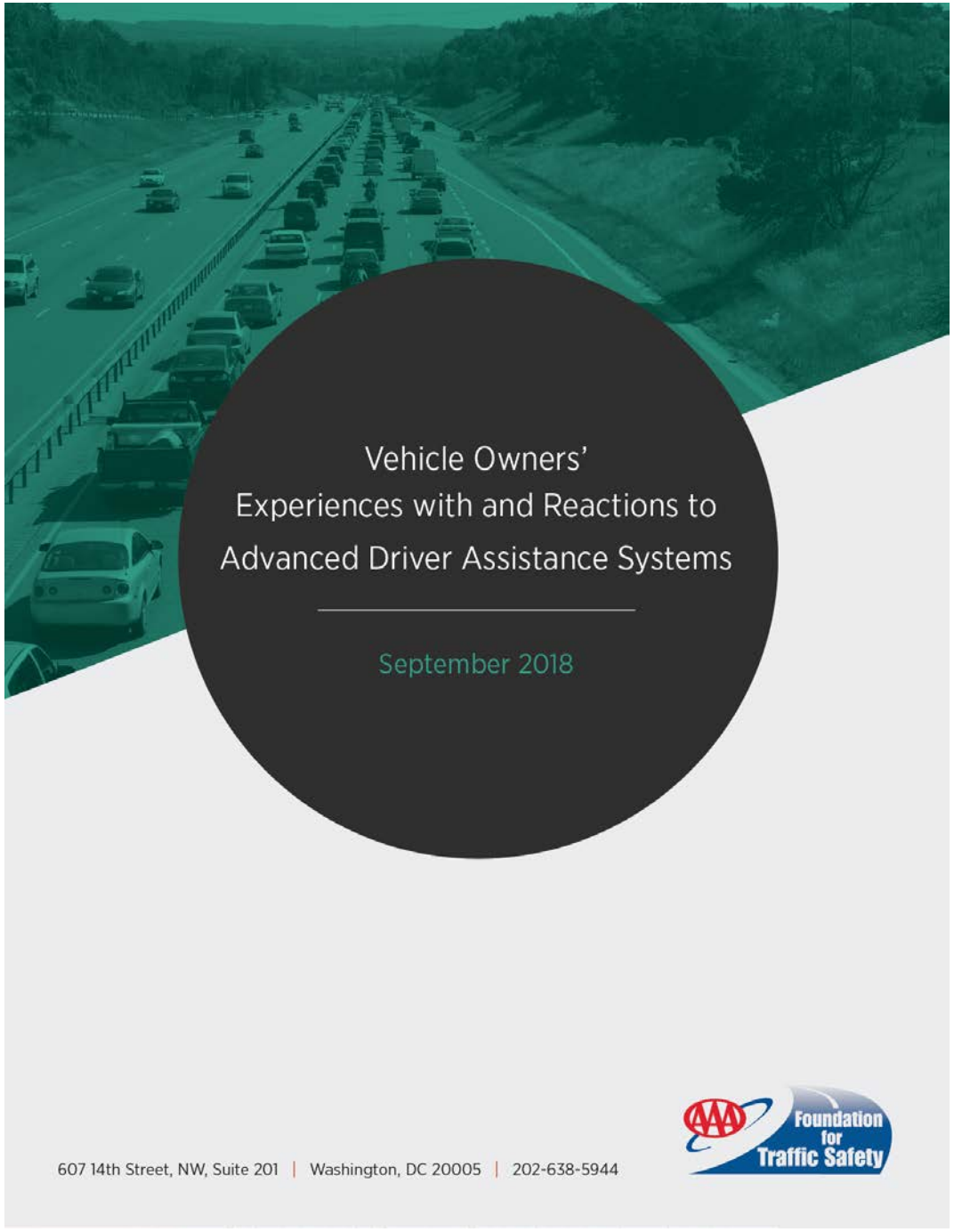

- Examined knowledge, attitudes, experiences of drivers who owned vehicles with ADAS

- Performed by University of Iowa for AAA Foundation

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Methodology

- Catalogued technologies for vehicles comprising 99% of total market share (2016-2017)

- Purchased list of 10,000 names & addresses of registered owners of vehicles with 3+ systems standard
  - Distribution of vehicles roughly proportional to market share
  - List from IHS Automotive (formerly RL Polk & Co.)
  - Included data from most states in U.S.

Findings

- Generally favorable opinions about technologies examined
- Main sources of information on ADAS – owner's manual, dealer, trial and error
- Nearly 1:3 owners of vehicles with ACC reported feeling comfortable at least occasionally engaging in other tasks while driving because of ACC
- Nearly 1:3 owners with BSM reported sometimes changing lanes without manually checking blind spot

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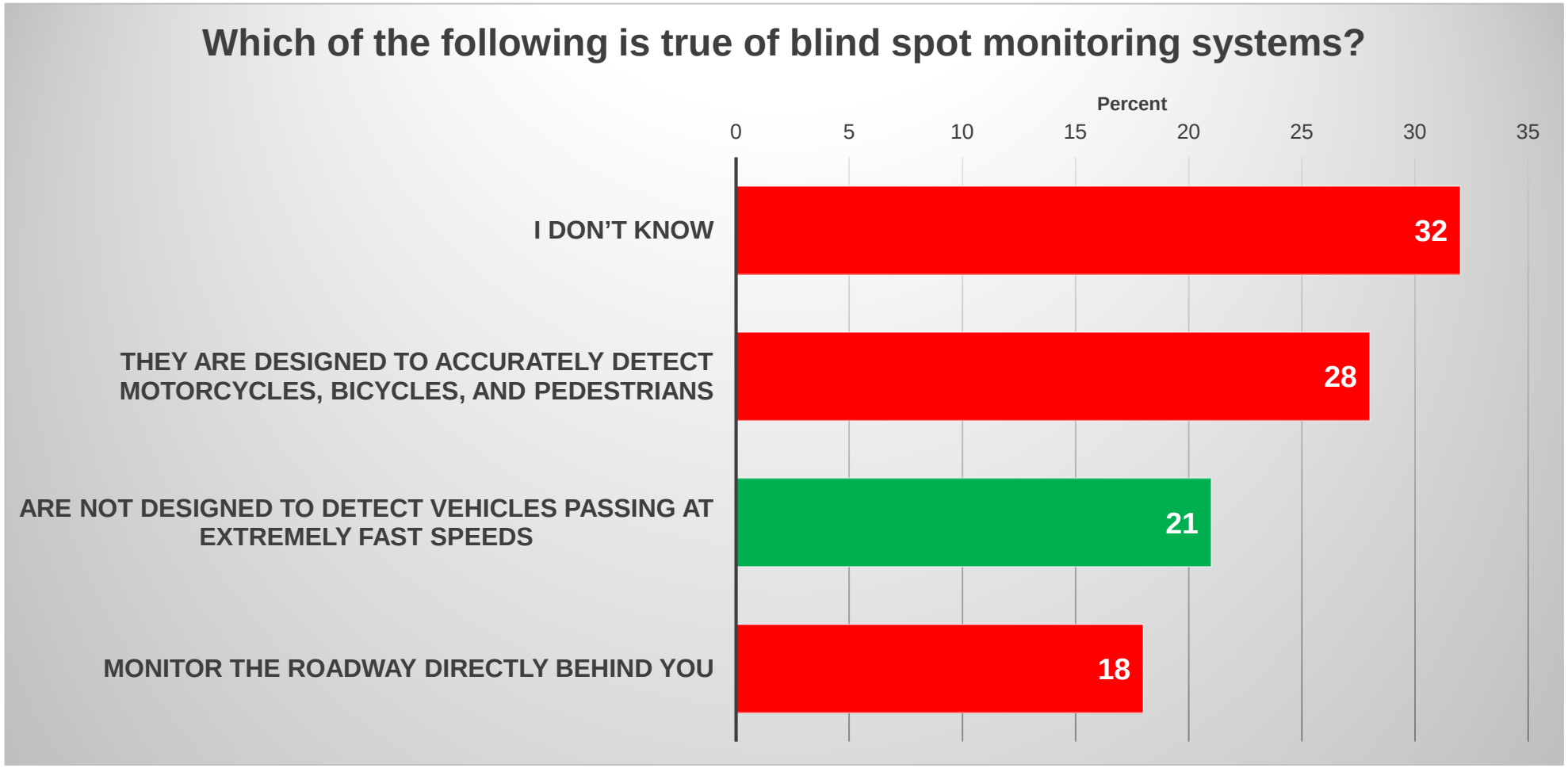
Example: Understanding of BSM

(509 owners of vehicles with BSM)



Traffic Safety Culture Index & Emerging Transportation Technologies (TSCI-ETT)

2018 survey included additional items pertaining to automated vehicles (AVs) such as:

- Understanding of AVs
- Perceived benefits of AVs
- Perceived risks/concerns of AVs

https://www.cnet.com/roadshow/news/self-driving-car-guide-autonomous-explanation/

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TSCI-ETT (continued)

Purpose of extension

- Understand role of emerging technologies in today's traffic safety culture & future
- Characterize users' expectations & acceptance of emerging technologies in relation to other factors
- Explore relationship between traditional traffic safety and emerging technologies-related beliefs & perception
- Examine possible determinants of user acceptance

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Understanding the Impact of Technology: Can Advanced Driver Assistance and Semi-Automated Vehicle Systems Lead to Improper Driving Behavior?

- An increased prevalence of secondary task engagement because of greater perceived workload capacity or reduced perceived responsibility for driving safety?

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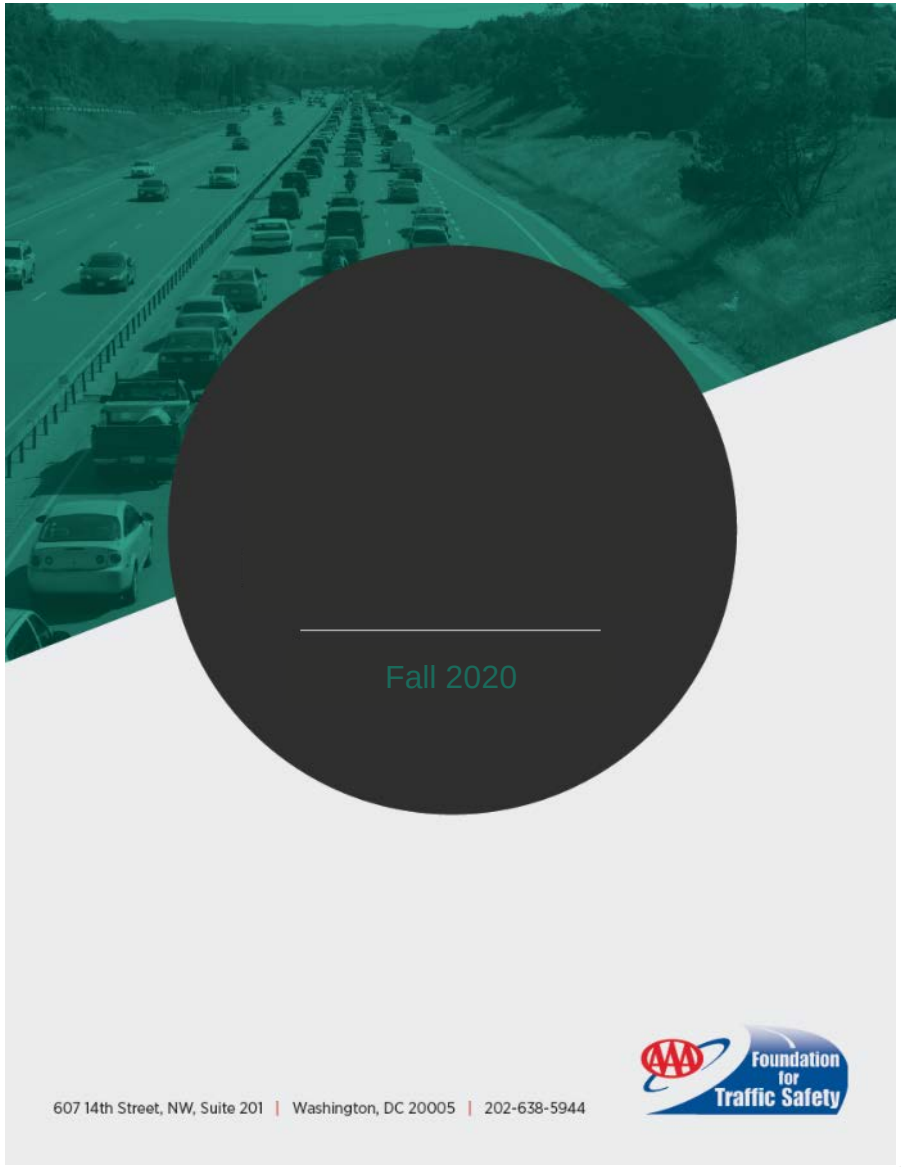
Impact of Drivers' Mental Models of Advanced Vehicle Technologies on Safety and Performance

- Examine how errors in drivers' understanding (mental models) of automated systems impact their in-vehicle behaviors, safety & performance



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Study Approach

- Review & development of error taxonomy
  - Literature & technology review
  - Task analysis for ADS and ADAS errors
- Driving simulator study
  - Measure and differentiate drivers with good, moderate and poor mental models
  - Examine driver performance and safety in critical “edge case” scenarios
  - 108 drivers (ages 40-65) in a high fidelity driving simulator

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SAFETY RESEARCH USING SIMULATION
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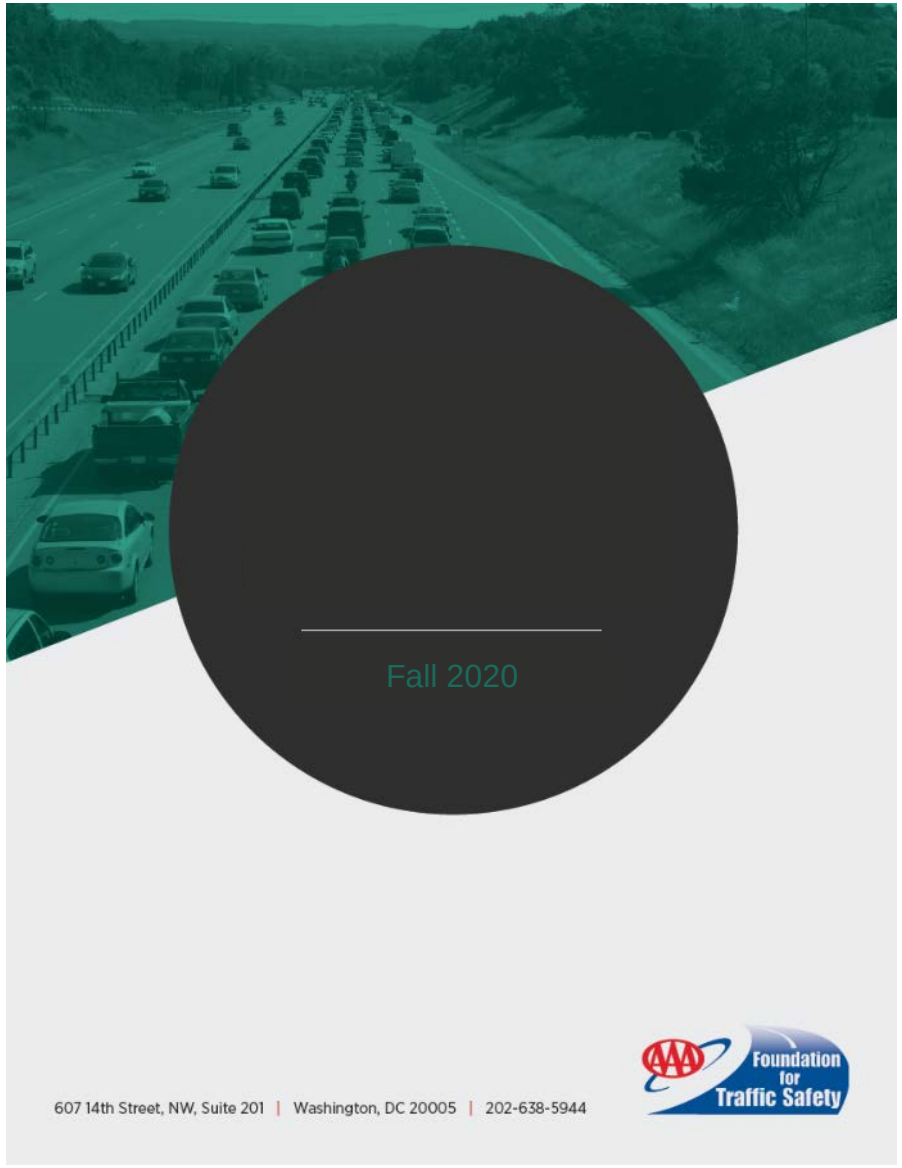

Impact of Information Sources on Consumer Understanding of Automated Driving Systems

- Many drivers do not understand limitations of advanced vehicle technologies
- Names not standardized, may contribute to confusion
- Consumer information vs. understanding & behavior

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Impact of Vehicle Technologies & Automation Forums

November 4-5, 2019 – University of California San Diego

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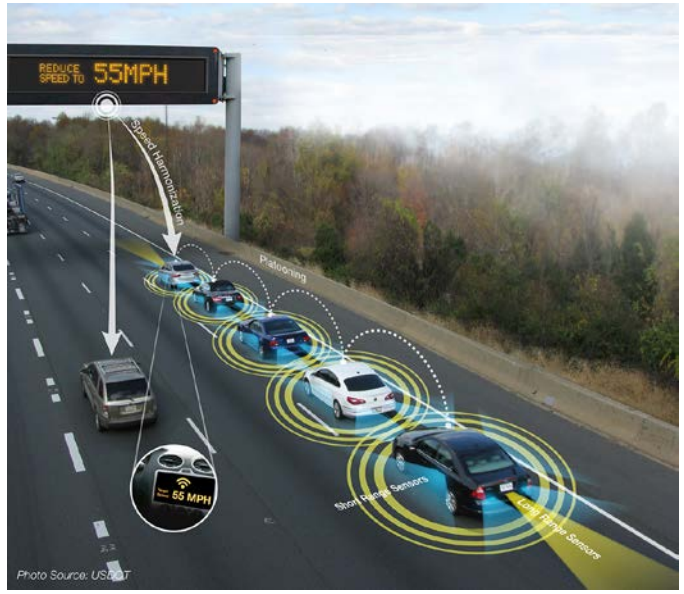
Technologies have great potential to improve safety by influencing behaviors of users

Good designs will encourage correct & safe behaviors

Proper use & application of technologies will lead to safety improvements

https://www.viatech.com/en/systems/computer-vision-solutions/adas/?cn-reloaded=1



https://www.infrastructurereportcard.org/tag/autonomous-vehicles/

https://www.aaafoundation.org