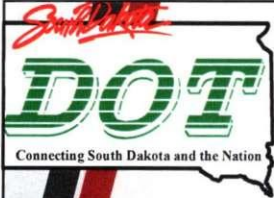


Impacts of Electric, Connected, & Automated Vehicles
David Huft, South Dakota Department of Transportation



Connecting South Dakota and the Nation

Impacts of Electric, Connected, & Automated Vehicles

David Huft, SDDOT Research Program Manager
South Dakota Transportation Commission
June 27, 2019

Presentation Outline


- Vehicle Technologies
 - Electric Vehicles
 - Connected Vehicles
 - Automated Vehicles
- Adoption Outlook
- USDOT Roles
- State Roles
- Useful Resources

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Definitions

- Electric Vehicle—Powered substantially or entirely by electricity
- Connected Vehicle—Actively communicates with other vehicles, infrastructure, road users
- Automated Vehicle—Drives with little or no driver interaction
- Definitions are not mutually exclusive

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Electric Vehicles

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EV Issues

- Charging Infrastructure
- Cold Weather
- Crash Response
- Road Use Charges

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Preparing for the Future of Transportation: Automated Vehicles 3.0 USDOT



Connected Vehicles

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Connected Vehicle Messaging

- Vehicle-to-Vehicle (V2V)
- Vehicle-to-Infrastructure (V2I)
- Vehicle-to-Anything (V2X)

Basic Safety Message (by vehicle)

- Location
- Heading
- Speed

Other Messages

- Traffic Signals
- Speed Limits
- Incidents
- Work Zones
- Snowplows
- Distress Calls
- Railroad Crossings
- School Buses
- etc.

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Traffic Signal Example



- V2V, V2I, V2X communication
- Signal Phase and Timing (SPaT)
- 20 signals in every state by 2020?

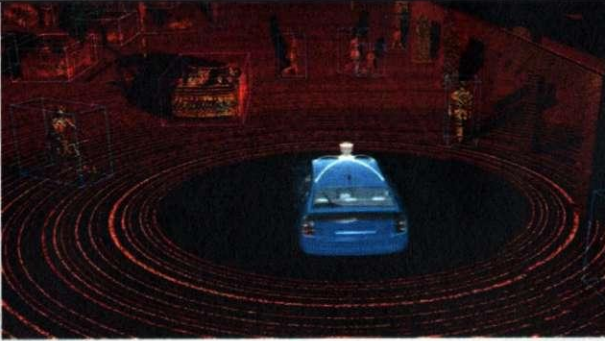
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Connected Vehicle Issues

- Operational Changes
- Deployment Cost
- Technology Choices
 - Digital Short Range Communications
 - 5G Cellular
 - Satellite
- Data Backhaul
- Cybersecurity

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Automated Vehicles




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Automated (or Autonomous) Vehicles




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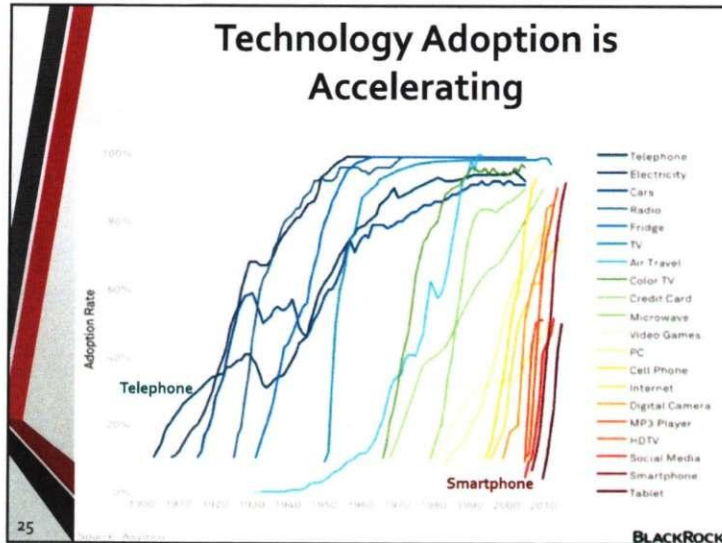
Levels of Automation

Level 0 No Automation	Level 1 Driver Assistance	Level 2 Partial Automation
	Assists driver in some situations	Can control speed and lane position in certain conditions
		
In complete control at all times	Must monitor, engage controls, and be ready to take control	Must monitor and be ready to take control

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Preparing for Automated Vehicles: Traffic Safety Issues for States, Governors Highway Safety Association

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Computing Cost & Power Trend

- 2000
 - ASCI RED - Sandia National Labs
 - 1 TFLOP
 - \$46M
- 2018
 - NVIDIA Drive PX™ Pegasus
 - 320 TOPS
 - \$600

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Level 4 & 5 Vehicle Adoption

Stage	Decade	Vehicle Sales	Vehicle Fleet	Vehicle Travel
Large price premium	2020s	2 – 5%	1 – 2%	1 – 4%
Medium price premium	2030s	20 – 40%	10 – 20%	10 – 30%
Small price premium	2040s	40 – 60%	20 – 40%	30 – 50%
Standard on most new vehicles	2050s	80 – 100%	40 – 60%	50 – 80%

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Preparing for Automated Vehicles: Traffic Safety Issues for States, Governors Highway Safety Association

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State Responsibilities




- Human driver licensing
- Motor vehicle registration
- Traffic law enactment & enforcement
- Safety inspections
- Insurance & liability regulation
- Planning, building, managing, operating road & transit infrastructure

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State AV Laws & Legislation

AS OF JUNE 2018



- 13 states authorized a study
- 4 states regulate truck platooning
- 4 states authorize testing with a human operator
- 2 states authorize testing without a human operator
- 1 state and D.C. authorize full deployment with a human operator
- 10 states authorize full deployment without a human operator

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State Policy Considerations

- AV Stance
 - "Cutting edge" or "wait and see"?
 - Permissive or regulatory?
- Vehicle Registration
 - Identify AV Level?
- Driver Licensing
 - Operator training
 - Driver education
 - License testing
 - Examiner training
 - License needed for Level 4 – 5?

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State Policy Considerations

- Enforcement
 - Traffic laws
 - Communicating to AV, occupants
 - Crash response
 - Crash investigation, use of vehicle data
- Commercial Vehicles
 - Screening
 - Inspection
 - Hours of service
 - Safety responsibility
 - Platooning
- Insurance
 - Financial responsibility

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Questions?

-
-
-
-

Contact

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Thank You!!

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2019 House Bill 1068

AN ACT

ENTITLED, An Act to authorize the Transportation Commission to promulgate rules to allow certain motor vehicles to follow another motor vehicle on a state highway more closely than otherwise permitted by law.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF SOUTH DAKOTA:

Section 1. That chapter 32-26 be amended by adding a NEW SECTION to read:

The Transportation Commission shall promulgate rules, pursuant to chapter 1-26, to authorize the testing and operation of groups of individual motor vehicles traveling in a unified manner at electronically coordinated speeds and distance intervals that are closer than otherwise allowed under §§ 32-26-40 to 32-26-42, inclusive. The commission may include in the rules:

- (1) The procedures for the requesting and granting of authority for testing and operation;
- (2) A fee, not to exceed one hundred dollars, to cover the administrative costs of granting authority for testing and operation;
- (3) Reporting requirements;
- (4) Authorized routes;
- (5) Authorized times and periods of operation;
- (6) Authorized vehicle types;
- (7) Required vehicle markings;
- (8) Driver requirements;
- (9) Prohibited use related to weather, highway conditions, special events, traffic incidents, emergencies or other contingencies; and
- (10) Any speed, size, and operational restrictions the commission deems appropriate.

SDCL 32-26-40. Following too closely--Violation as misdemeanor. The driver of a motor vehicle may not follow another vehicle more closely than is reasonable and prudent, having due regard for the speed of such vehicles and the traffic upon and condition of the highway. A violation of this section is a Class 2 misdemeanor.

SDCL 32-26-41. Minimum distance between trucks or towed vehicles--Exception for overtaking--Violation as misdemeanor. The driver of any motor truck or motor vehicle drawing another vehicle when traveling upon a highway outside of a business or residence district, and which is following another motor truck or motor vehicle drawing another vehicle shall, whenever conditions permit, leave sufficient space so that an overtaking vehicle may enter and occupy such space without danger.

However, a motor truck or motor vehicle is not prevented from drawing another vehicle from overtaking and passing any like vehicle or other vehicle. A violation of this section is a Class 2 misdemeanor.

SDCL 32-26-42. Minimum space in caravans and motorcades--Exceptions--Violation as misdemeanor. Any motor vehicle being driven upon any roadway outside of a business or residence district in a caravan or motorcade whether or not towing other vehicles shall be so operated as to allow sufficient space between each such vehicle or combination of vehicles so as to enable any other vehicle to enter and occupy such space without danger. This provision does not apply to funeral processions or processions controlled by law enforcement for security of people or property. A violation of this section is a Class 2 misdemeanor.