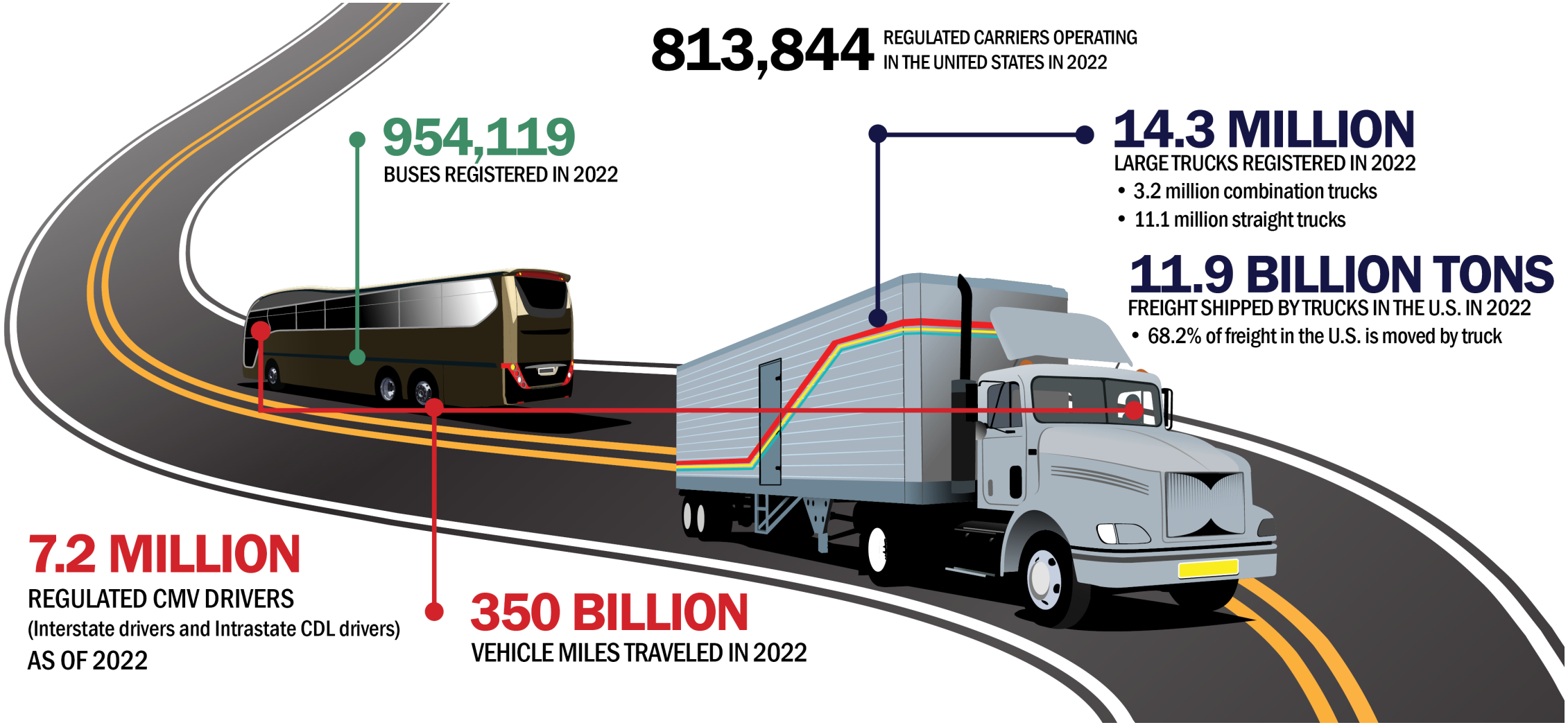
FMCSA ADS Safety Research

Southeast CMV Safety Summit

August 28, 2024

U.S. Department of Transportation
Federal Motor Carrier Safety Administration

Snapshot of the CMV Industry



813,844 REGULATED CARRIERS OPERATING IN THE UNITED STATES IN 2022

954,119
BUSES REGISTERED IN 2022

14.3 MILLION
LARGE TRUCKS REGISTERED IN 2022
- 3.2 million combination trucks
- 11.1 million straight trucks

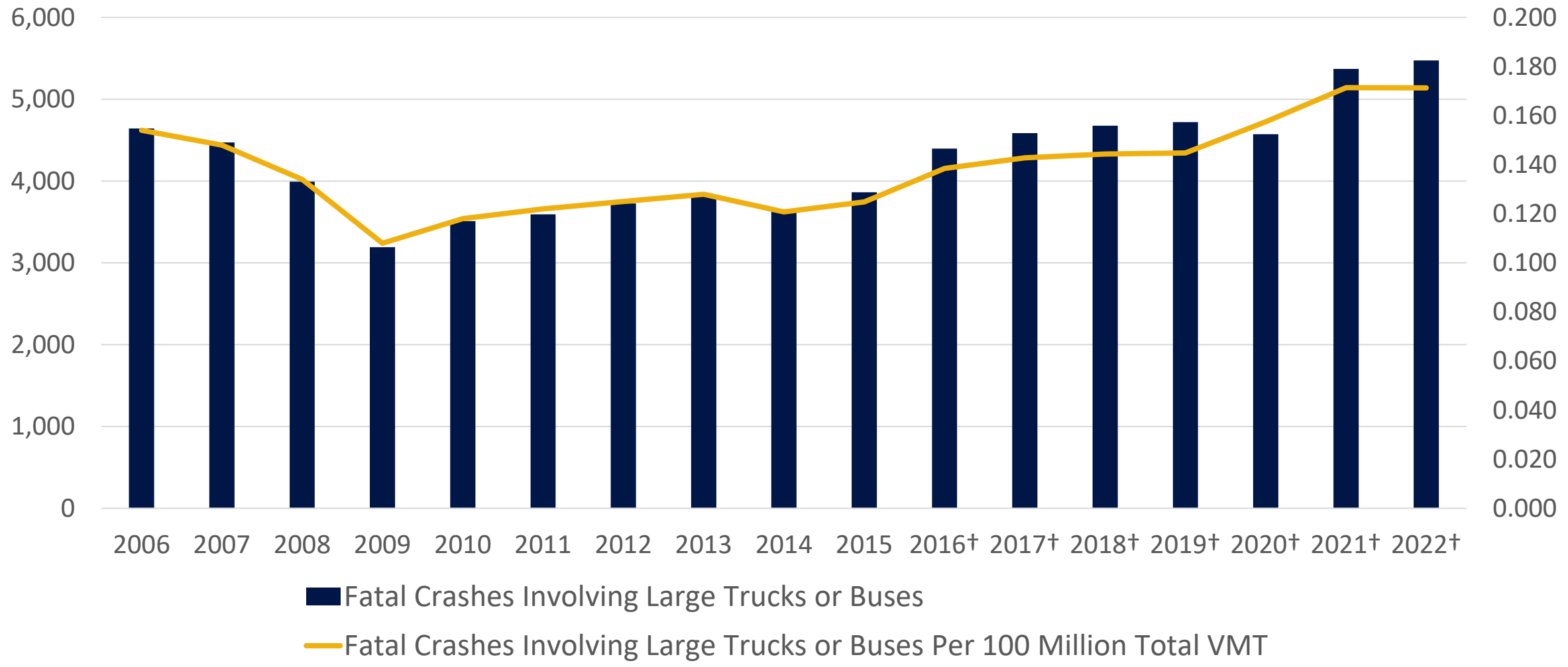
11.9 BILLION TONS
FREIGHT SHIPPED BY TRUCKS IN THE U.S. IN 2022
- 68.2% of freight in the U.S. is moved by truck

7.2 MILLION
REGULATED CMV DRIVERS
(Interstate drivers and Intrastate CDL drivers)
AS OF 2022

350 BILLION
VEHICLE MILES TRAVELED IN 2022

U.S. Department of Transportation
Federal Motor Carrier Safety Administration

Fatal Crashes Involving Large Trucks and Buses and Fatality Rate
(2006 – 2022) - FARS Data



FMCSA ADS Research

FMCSA Automated CMV Evaluation (ACE) Program

How will public entities interact with ADS-equipped CMVs?

- *Test various use cases*
- *Support industry standards and best practices development*
- *Inform regulatory activities and policy decisions*

ACE
Automated Commercial Motor Vehicle Evaluation

Roadside Inspection / Enforcement

Port Drayage

Work Zones

Emergency Response

Smart Trailers

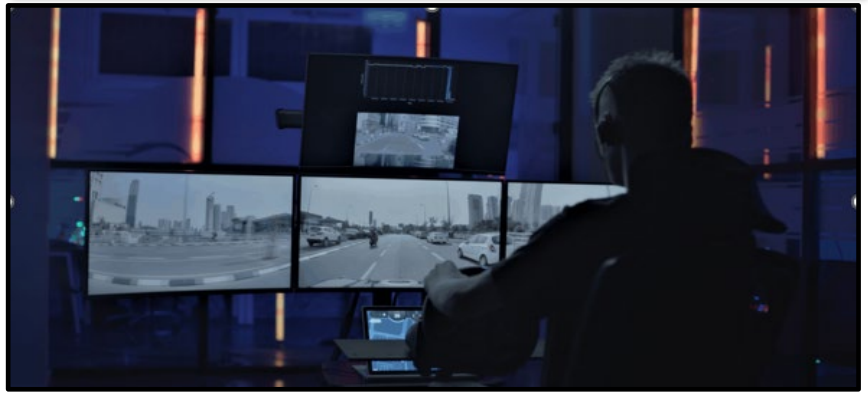
Vulnerable Road Users

2020 → **2025**

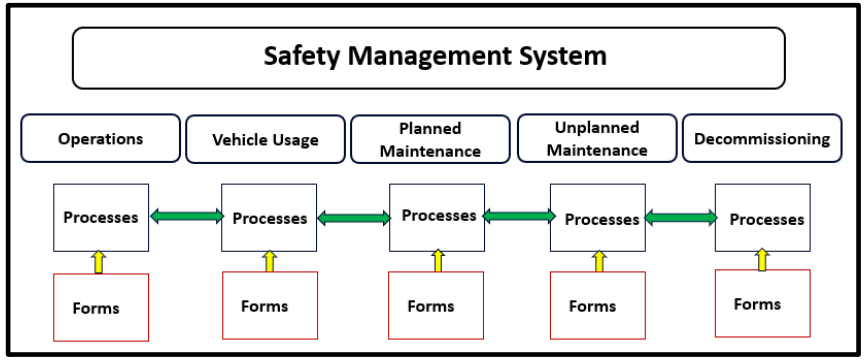
Examples of Relevant FMCSA ADS Research

- **ADS Safety Metrics Project**
  - **Goal:** Evaluate the safe driving performance of an ADS-equipped CMV
  - **Contractor:** Virginia Tech Transportation Institute

- **Teleoperations Cybersecurity Project**
  - **Goal:** Identify the cybersecurity risks associated with teleoperated automated CMVs
  - **Contractor:** Volpe



- **Model Operational Safety Plan**
  - **Goal:** Develop a model operational safety plan for motor carriers operating automated CMVs
  - **Contractor:** Volpe



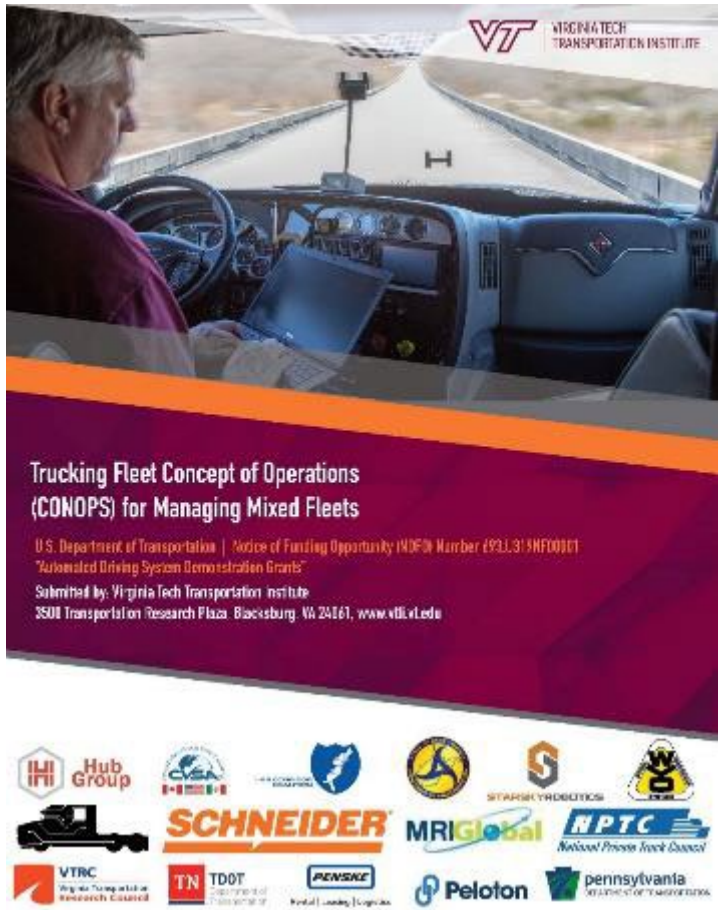
Examples of Relevant FMCSA ADS Research cont…

- **Safety Impacts of Human-ADS Team Driving Applications**
  - **Goal:** Study the safety implications of interactions between humans and automated driving systems (ADSs) in emerging trucking operational scenarios.
  - **Contractor:** Virginia Tech Transportation Institute

- **Motor Carrier Operation of Automated Driving Systems (ADS)-Equipped Commercial Motor Vehicles**
  - NPRM forecasted for December 2024

ADS Trucking Conops Grant

Funded by U.S. DOT's Automated Driving System (ADS) Demonstration Grant, 2020-2024



Performed by:

VIRGINIA TECH TRANSPORTATION INSTITUTE

PRONTO

Texas A&M Transportation Institute

Managed by:
William (Bill) Anderson, VA – FMCSA
Thomas (Tom) Kelly, US DOT – FMCSA

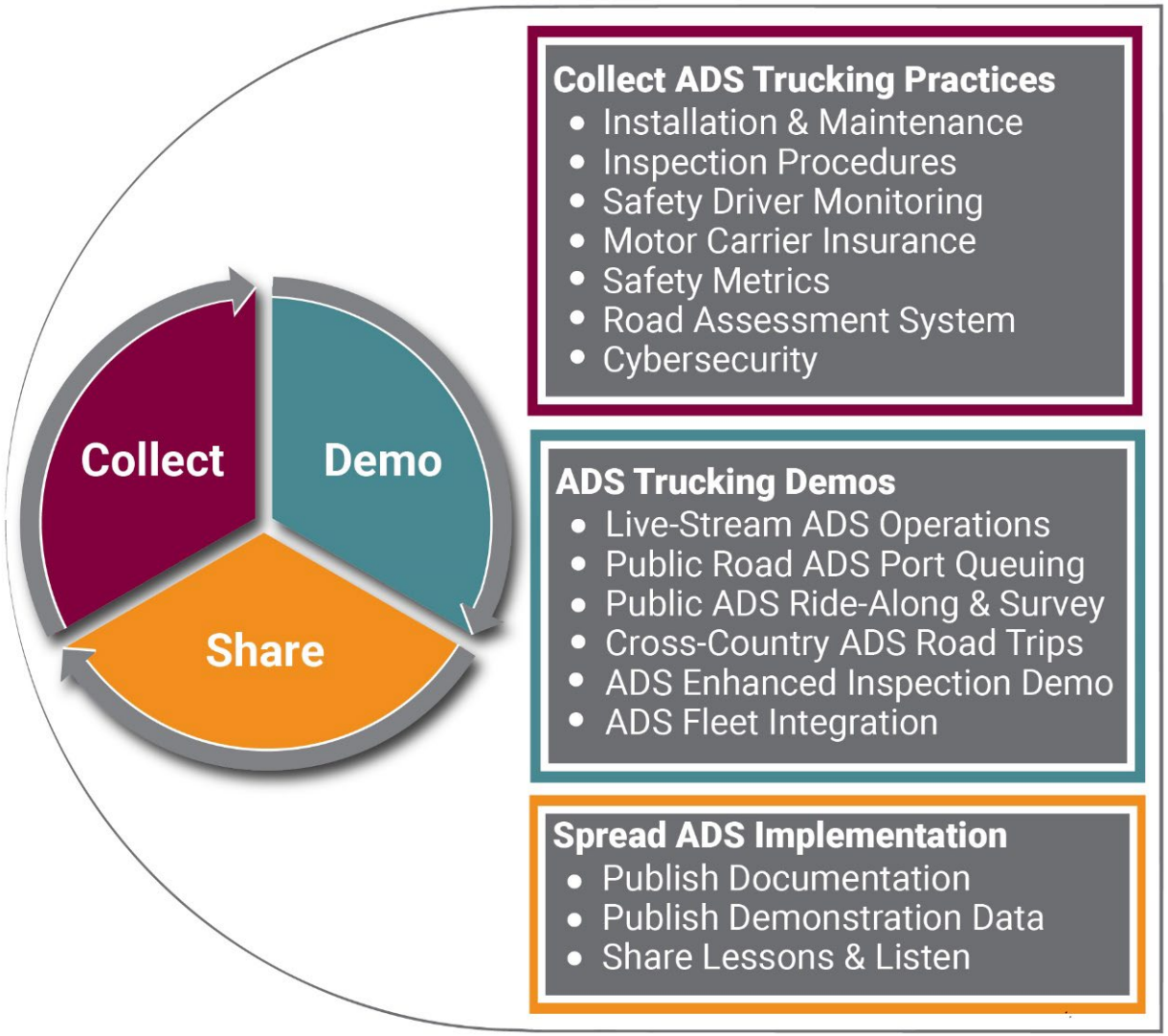
U.S. Department of Transportation
Federal Motor Carrier Safety Administration

Support provided by:

- Travelers Institute
- Commercial Vehicle Safety Alliance
- Kodiak Robotics
- Drivewyze
- Texas Department of Public Safety
- Florida Department of Transportation

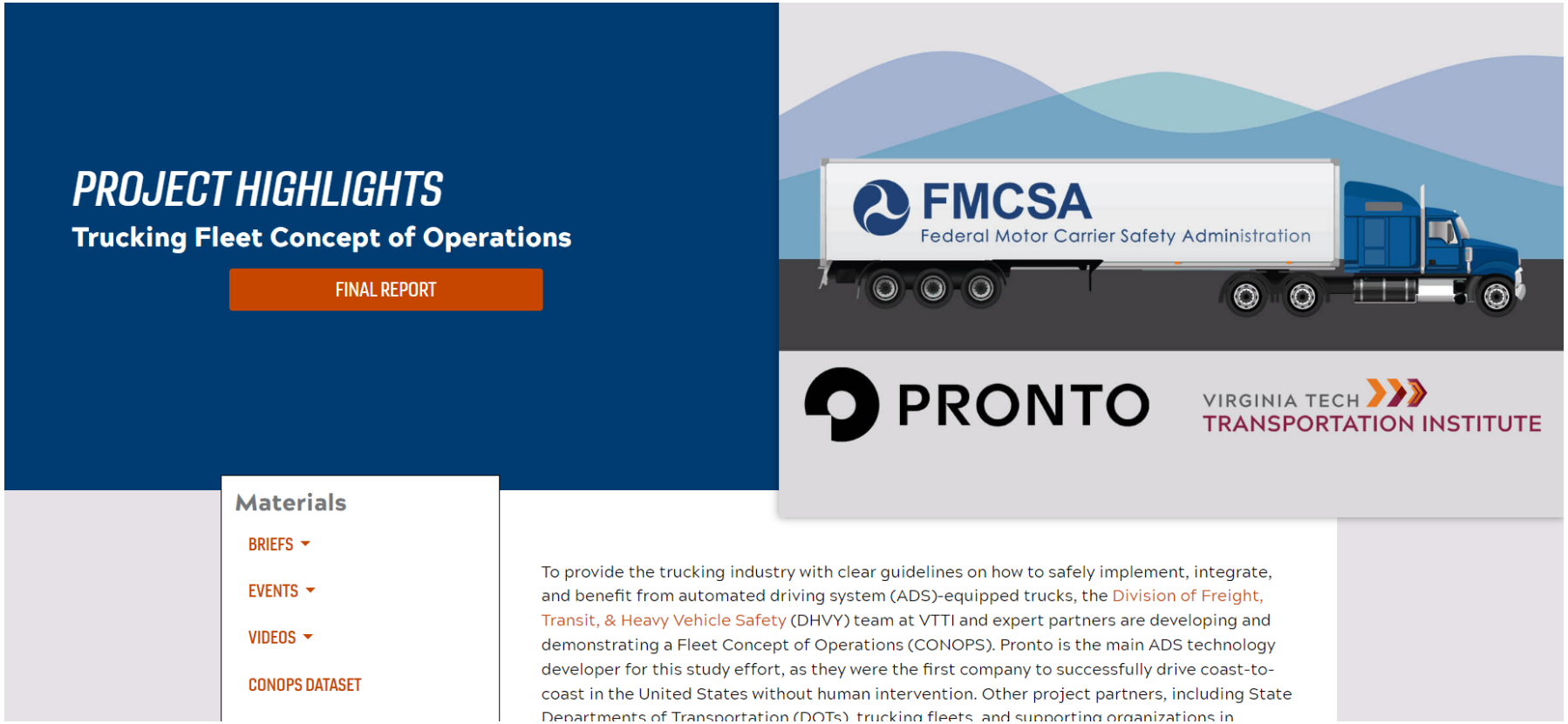
ADS Trucking Conops Grant

CONOPS Approach



- Collection of practices to be turned into guidelines
- Demonstrations informed by practices and available technology that show capabilities and gather feedback from public
- Share status and knowledge actively throughout the entire grant period

Project Completed March 2024



Grant Webpage

https://www.vtti.vt.edu/projects/conops.html

- Briefs
- Events
- Videos
- CONOPS Dataset
- **Final Report**

ADS Inspection Video

AV Trucking Enhanced Inspection Pilot (youtube.com)

FMCSA ACE Inspection Demonstrations and Evaluations – Demo Overview

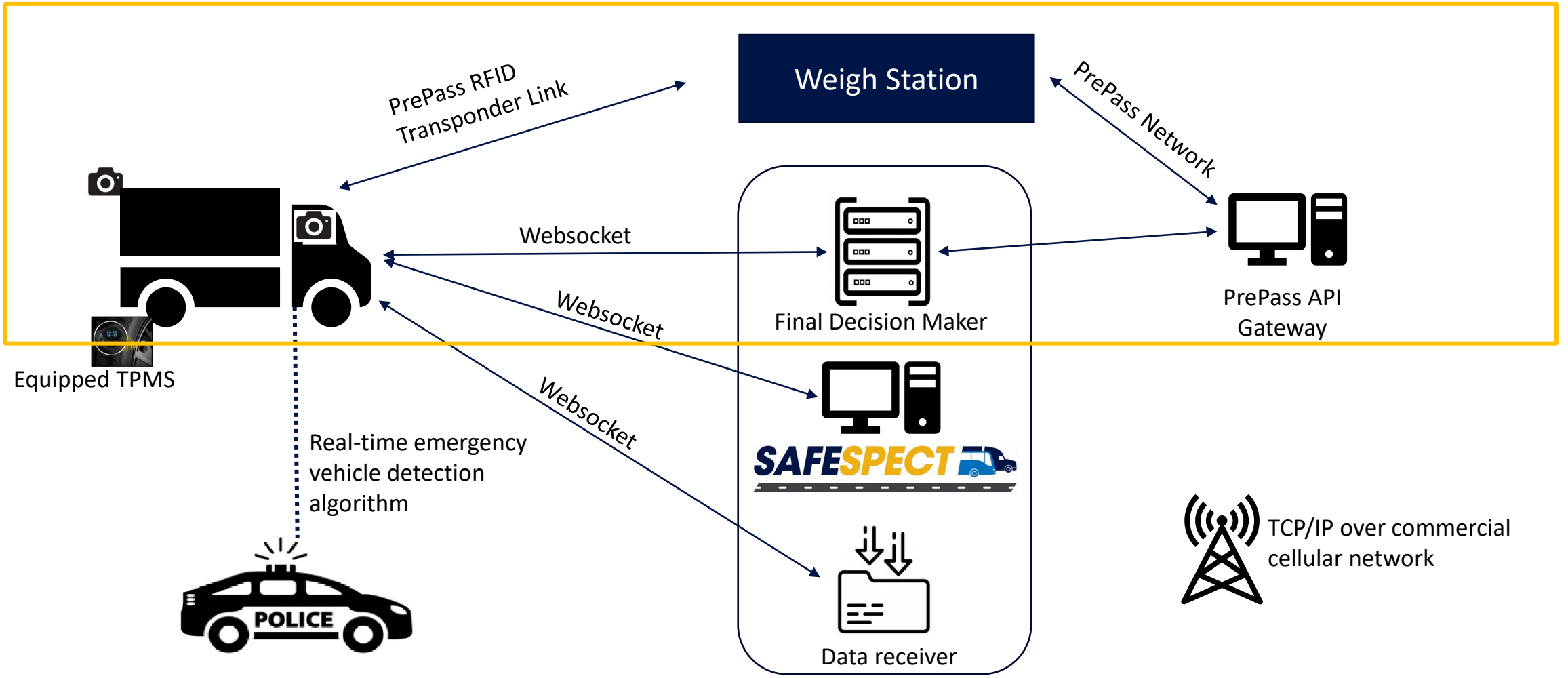
U.S. Department of Transportation
Federal Motor Carrier Safety Administration

Project Overview

- Explore and prototype processes, communication methods, and inspection technologies to facilitate electronic safety inspections of Automated Driving Systems (ADS)-equipped CMV operations at the roadside, at borders, and in other fixed enforcement locations.

Operational Test Scenario	Operation Summary
#1 ADS Health & Status	Electronic confirmation and communication of ADS health and status on equipped CMVs
#2 Predictive algorithms, analytics, and preventive maintenance data	Evaluate and test predictive algorithms, analytics, and preventive maintenance data (e.g., fleet management systems, total asset visibility systems) that would provide value to a roadside inspector for inclusion into their inspection application and electronic screening decision tools
#3 Enhanced pre-trip inspection communication	Communication of an enhanced pre-trip inspection status, certification, & data elements
#4 Inspection/weigh station "Pull-in or Bypass"	React and comply with law enforcement electronic messaging or static signs to "Pull-in or Bypass" an inspection/weigh station
#5 Populate roadside inspection application	Populate available data elements into a roadside inspection application when prompted or automatically
#6 Emergency lights/siren pull over or move over	Reaction to emergency lights and siren (SAE J3216 NO COOPERATIVE AUTOMATION) to either pull over or move over in compliance with State "Move Over Law".

High-level Logical Architecture

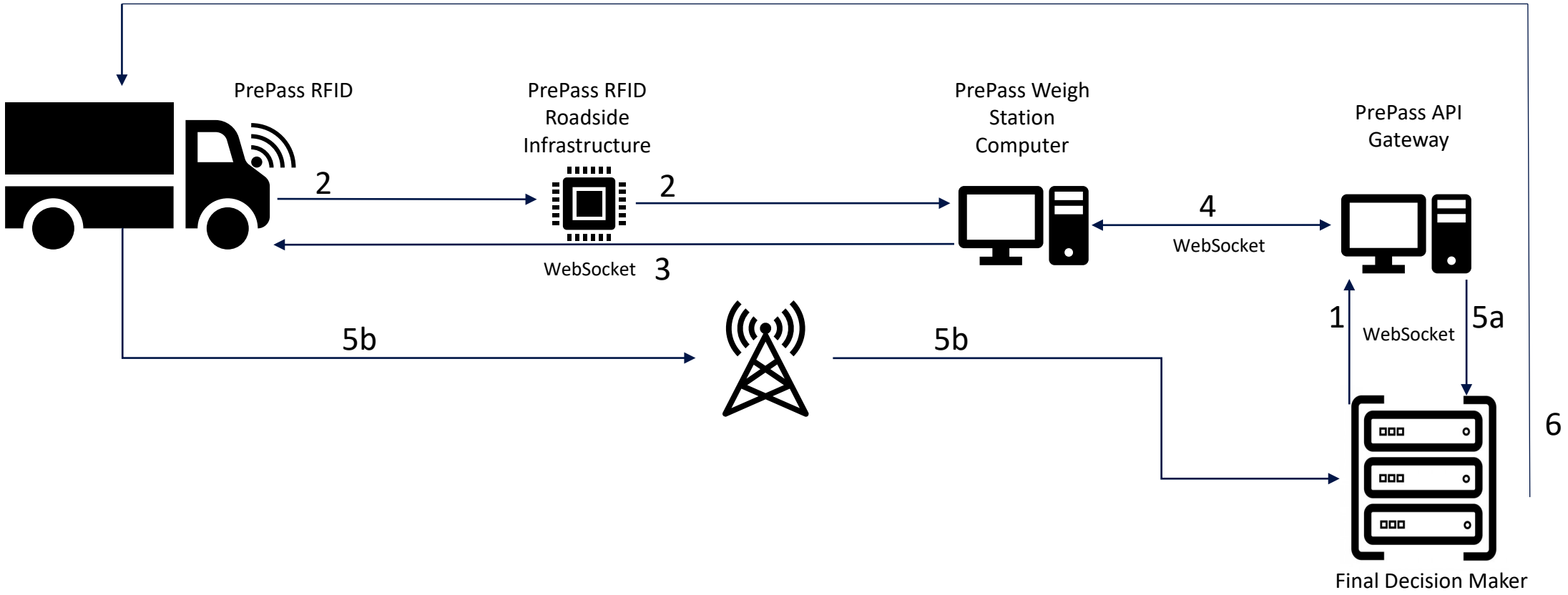


ADS Electronic Inspection Demo – Safety Data Message Set

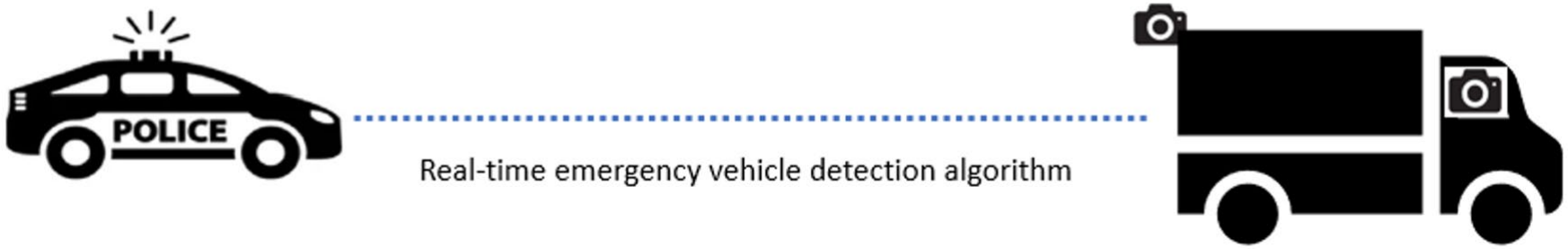
SafetyData.json > ...


```
{
    "type":"ADS_Safety",
    "data":{
        "Pre-trip Inspector":"John Doe",
        "Inspector ID":"ID00002",
        "Vehicle":"CARMA Blue Truck",
        "VIN":"1FUJGBDV8CLBP8898",
        "License Plate":"DOT-10002",
        "State":"VA",
        "Carrier Name":"FMCSA Tech Division",
        "Carrier ID":"DOT 1",
        "USDOT Number":"848271",
        "Gross Vehicle Weight":"80900",
        "Vehicle Axle Weight":"30410",
        "Overweight Permit Status":"Inactive",
        "Date of Last
        "Date of Last
        "Date of Last
        "ISS Score":
        "IFTA Status
        "IRP Status":
        "ADS Health":
        "ADS Status":
        "Truck Operat
        "Tractor Oper
        "Trailer Oper
        "Inspection I
        "Origin":"Lansing, MI",
        "Destination":"Los Angeles, CA",
        "Nearest Roadside Inspection Facility":"Cascadia",
        "Position":"37.186400,-80.393459",
            "Position":"37.186400,-80.393459",
            "Preclearance system":"PrePass",
            "ADS Time":"Mon, 06 Feb 2023 12:04:34",
            "TPMS":{
                "L STEER":{"PSI":"98","Condition":"0"},
                "R STEER":{"PSI":"94","Condition":"0"},
                "LFO":{"PSI":"90","Condition":"1"},
                "LFI":{"PSI":"91","Condition":"0"},
                "RFI":{"PSI":"91","Condition":"0"},
                "RFO":{"PSI":"72","Condition":"1"}}}
```

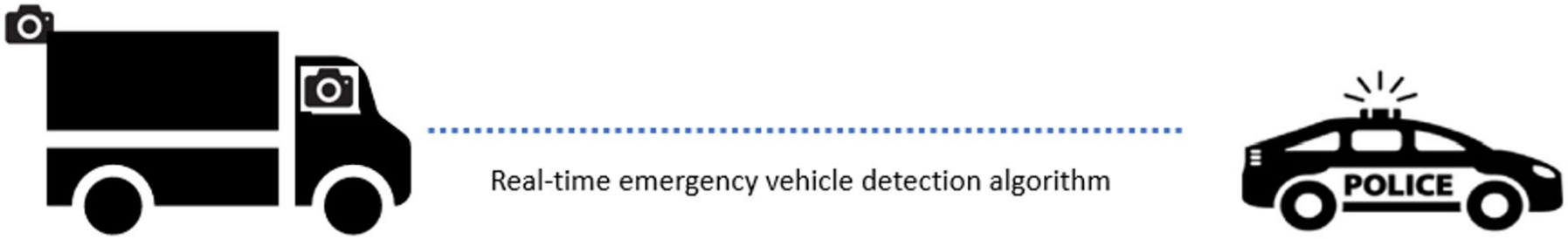
Demo 1 – ADS Electronic Inspection – Bypass/Pull-in



Demo 2 – Law Enforcement Emergency Pullover



Demo 3 – ADS Truck Moveover



ADS Demo Video

U.S. Department of Transportation
Federal Motor Carrier Safety Administration

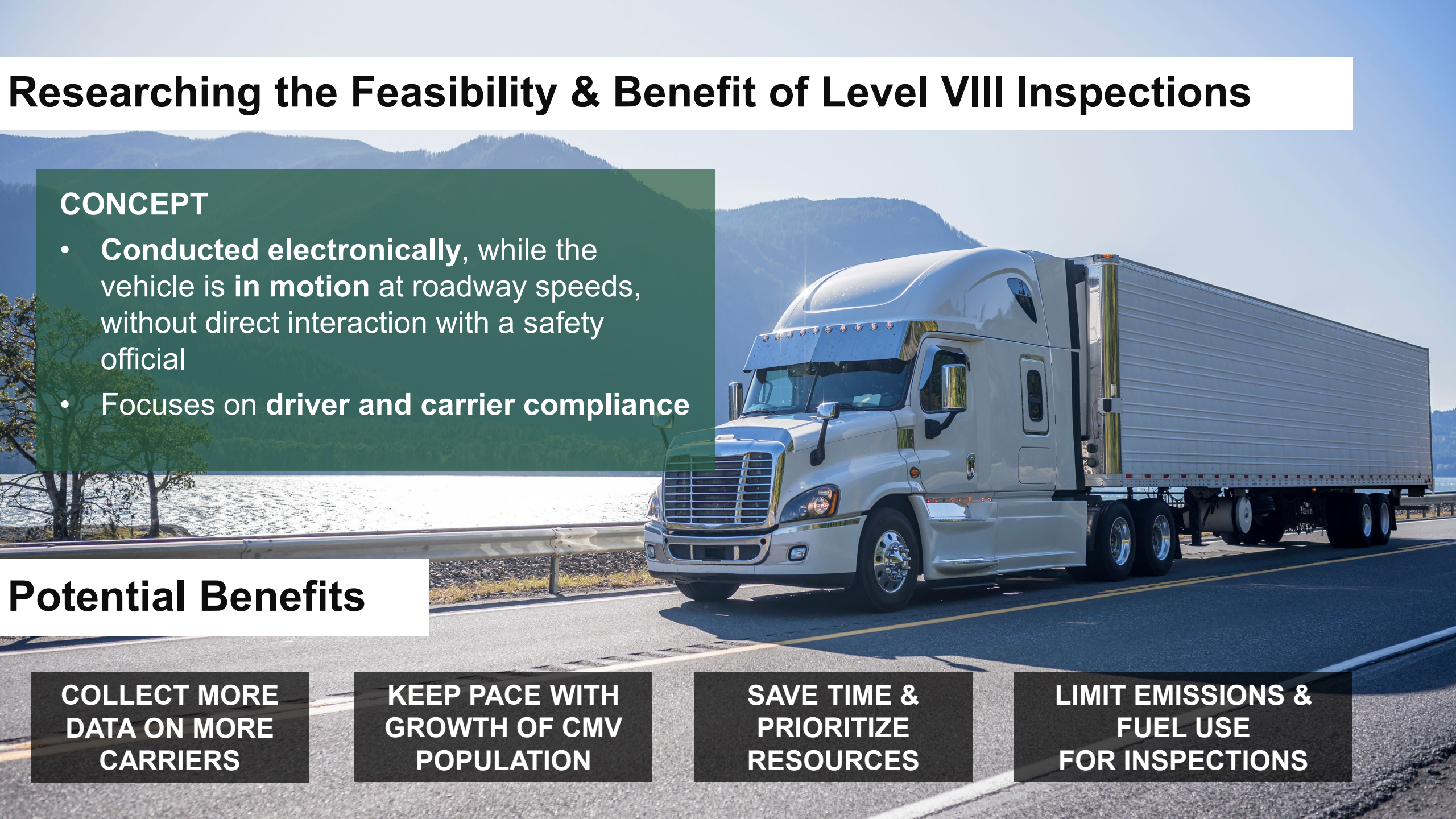
Level VIII

INSPECTION OPERATIONAL TEST

Southeast CMV Research Safety Summit

University of Alabama
August 28, 2024

Researching the Feasibility & Benefit of Level VIII Inspections



CONCEPT

- **Conducted electronically**, while the vehicle is **in motion** at roadway speeds, without direct interaction with a safety official
- Focuses on **driver and carrier compliance**

Potential Benefits

COLLECT MORE DATA ON MORE CARRIERS

KEEP PACE WITH GROWTH OF CMV POPULATION

SAVE TIME & PRIORITIZE RESOURCES

LIMIT EMISSIONS & FUEL USE FOR INSPECTIONS

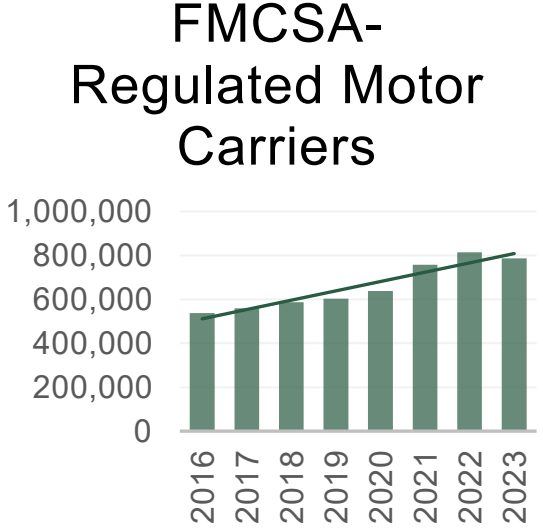
Inspecting a Growing Motor Carrier Population

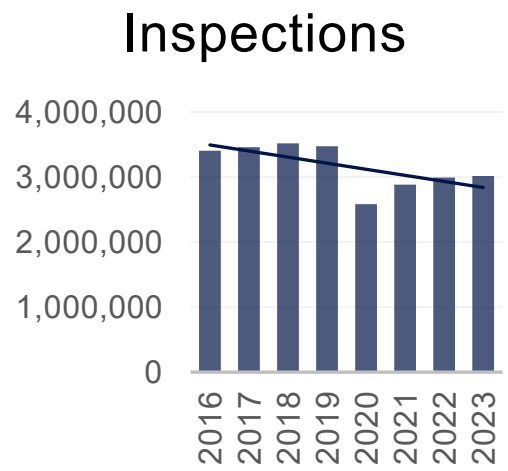
Roadside inspections are an important tool to help keep roadways safe…

# of Driver Inspections in Past 24 months	Driver OOS Rate
10+ inspections	4%
3-10 inspections	10%
2 inspections	11%
1 inspection	12%

July 2024 MCMIS two-year snapshot

…but **the motor carrier population is growing**, and we have **limited time and resources** to conduct inspections.





ARCHIVE_DATA at March 29, 2024 and SMS End of Year History Snapshot; MCMIS as of March 2024 and end of year 2016 to 2023

Level VIII Inspection Operational Test

Before deciding whether to move forward with Level VIII Inspections,

FMCSA needs to be **confident** we can electronically collect and process data that is

reliable,

accurate, and

used in a way that

benefits safety.

Through the operational test, we will:

1. Test the **technical feasibility** of transferring and evaluating Level VIII data while vehicles are in motion

2. Develop and evaluate **use cases**, **implementation options**, and **policies**

3. **Measure** the safety, climate, and operational **impacts**

Thoroughly Researching Level VIII Inspections

The operational test takes a **phased approach** to evaluate the feasibility and impact of Level VIII Inspections.

Initial **on-road testing** began in March 2024, starting in Mississippi and Kentucky and using a limited subset of data.

DATA ELEMENTS INCLUDED IN INITIAL TESTING	
✓ Descriptive location, including GPS coordinates	✓ Operating authority
✓ USDOT Number	✓ Unified Carrier Registration (UCR) compliance
✓ Power Unit (PU) registration	✓ FMCSA Out-of-Service Orders

Operational Test Status

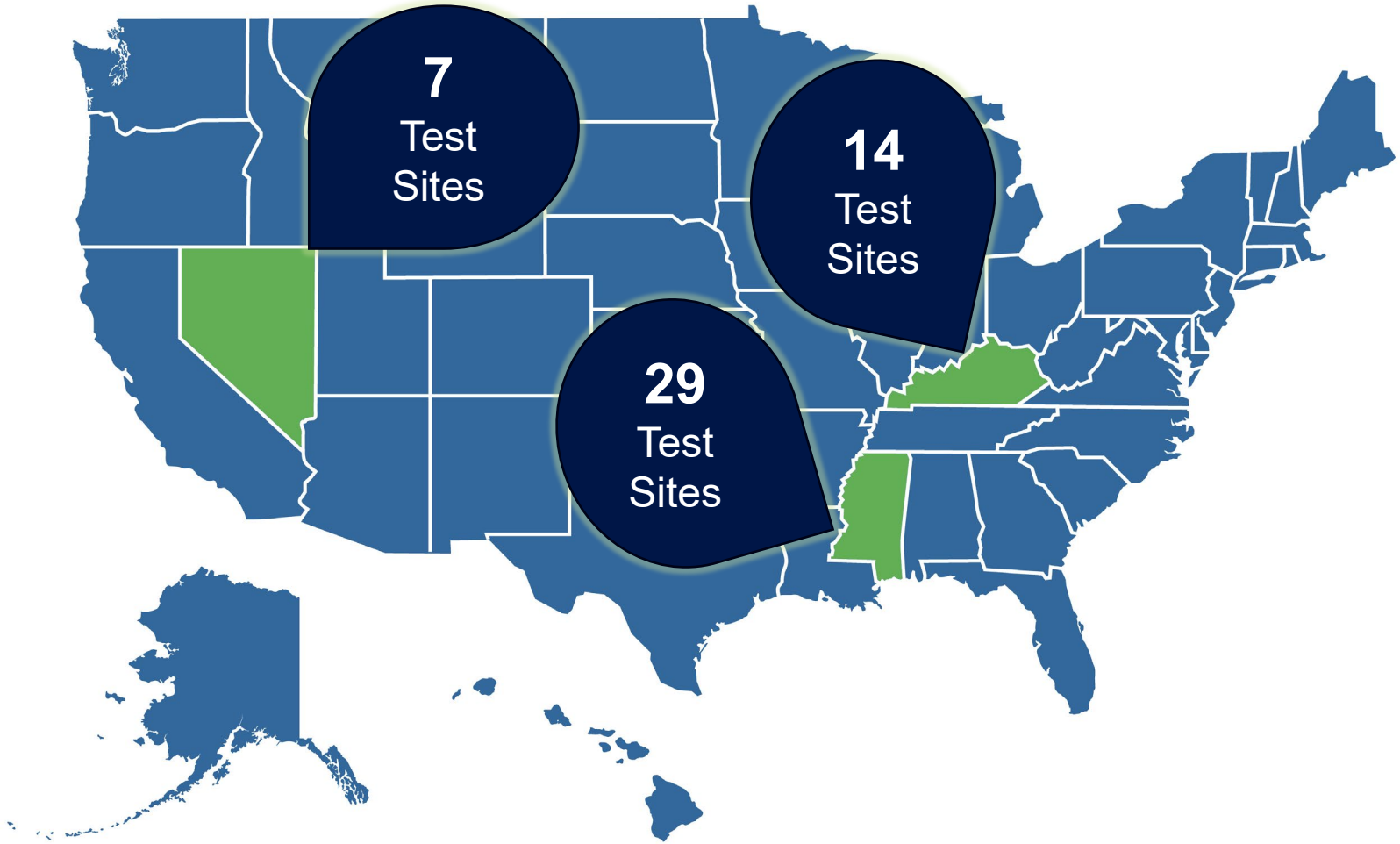
As of August 11, 2024:

3 states

50 test sites

6 carriers

100,591 data transfers



Lessons Learned: Understanding Volume

In July, **four participating carriers** in **three participating States** had

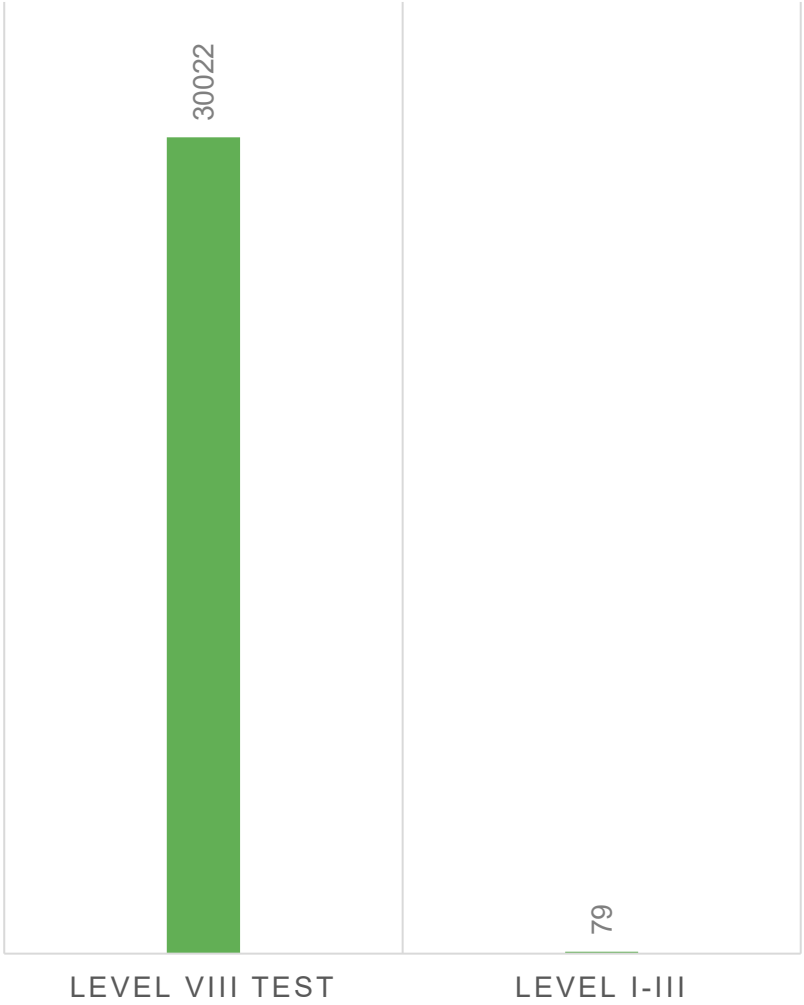
30,022

Level VIII data transfers

which is

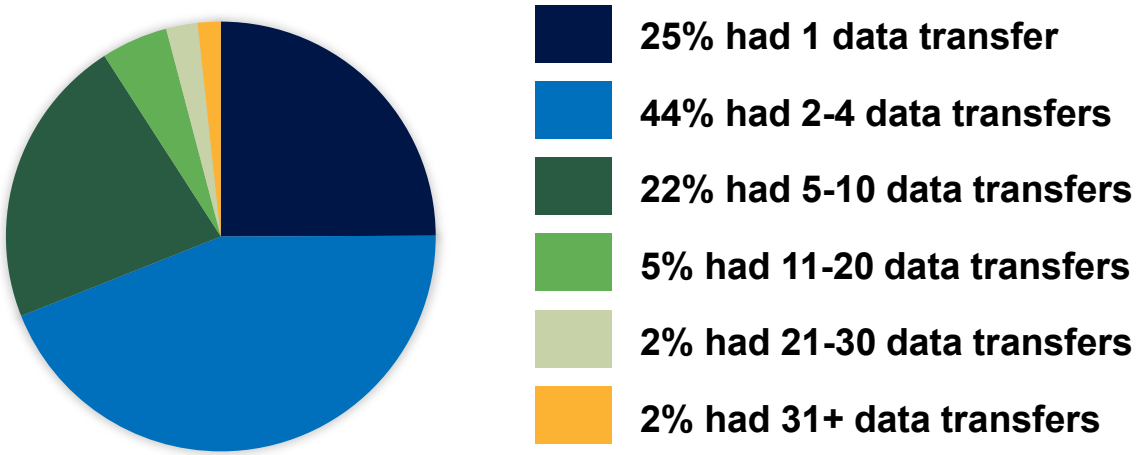
380 times

the number of driver inspections
those carriers had in those States in July
(79 Level I-III Inspections)



Lessons Learned: Understanding Frequency

July 2024: Number of Data Transfers for Each Truck



6,002 trucks from four participating carriers had at least one Level VIII data transfer in July. Of those trucks:

- Most (**69%**) received 1-4 data transfers during the month, averaging less than one per week.
- Only **2%** received an average of at least one per day (31+ data transfers in July).

Lessons Learned: Ensuring Data Quality

We evaluated the transmitted data in terms of…

Completeness

- Are we receiving all the inspections we expect to receive?
- Do they contain all the expected data elements?

Accuracy

- Does the data match authoritative sources (e.g., CDLIS, NHTSA vPIC)
- Does the data have obvious errors?

We worked with technology providers to solve issues related to…

GPS Location
Missing/incorrect lat/lon

VIN/License Plate
Missing data

Time Stamps
All showing 5:00 AM

Next Steps

UPCOMING MILESTONES

Incorporate ELD data and manually check for data validity and compliance

Expand participation, diversifying in terms of technology providers and motor carrier size

Prepare for Phase 2 with automatic data processing to detect violations

DATA ELEMENTS INCLUDED IN INITIAL TESTING

- ✓ Descriptive location, including GPS coordinates
- ✓ USDOT Number
- ✓ Power Unit (PU) registration
- ✓ Operating authority
- ✓ Unified Carrier Registration (UCR) compliance
- ✓ FMCSA Out-of-Service Orders

DATA ELEMENTS ADDED WITH ELD INTEGRATION

- ❑ Appropriate driver's license class and endorsement(s) for vehicle
- ❑ License status
- ❑ Current driver's Record of Duty Status (RODS)
- ❑ Valid Medical Examiner's Certificate and Skill Performance Evaluation (SPE) Certificate
- ❑ Hours-of-service (HOS) compliance

REMAINING DATA ELEMENTS IN DEFINTION

- ❑ Electronic validation of who is operating vehicle

U.S. Department of Transportation
Federal Motor Carrier Safety Administration

Level VIII

INSPECTION OPERATIONAL TEST

https://www.fmcsa.dot.gov/level-viii-inspections

Questions?

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