

Critical Issues for Autonomous Trucks...

Dan Murray
**American Transportation
Research Institute**

ATRI

Trucking industry's NFP research organization

- Safety
- Mobility
- Economic Analysis
- Technology
- Environment

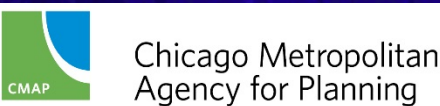
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AV/AT Definitions

At SAE **Level 0**, the human driver does everything;

At SAE **Level 1**, an automated system on the vehicle can sometimes assist the human driver conduct some parts of the driving task;

At SAE **Level 2**, an automated system on the vehicle can actually conduct some parts of the driving task, while the human continues to monitor the driving environment and performs the rest of the driving task;

At SAE **Level 3**, an automated system can both actually conduct some parts of the driving task and monitor the driving environment in some instances, but the human driver must be ready to take back control when the automated system requests;

At SAE **Level 4**, an automated system can conduct the driving task and monitor the driving environment, and the human need not take back control, but the automated system can operate only in certain environments and under certain conditions; and

At SAE **Level 5**, the automated system can perform all driving tasks, under all conditions that a human driver could perform them.

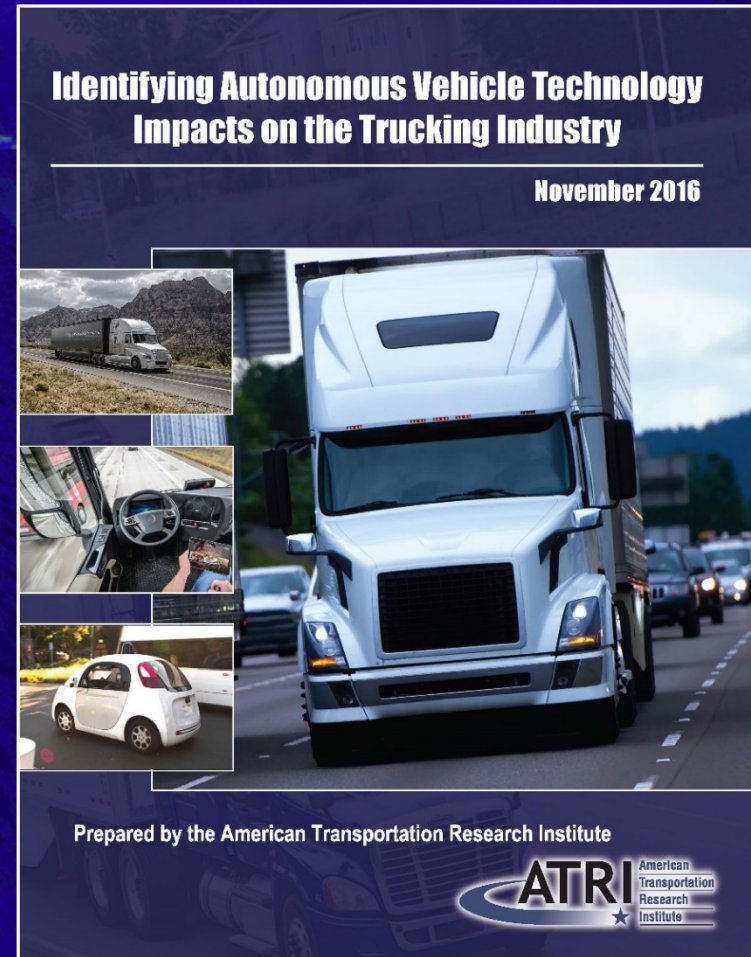
Techologies...

- **RADAR**
- **LIDAR**
- **Video Optics**

- **5.9 DSRC**
- **?????**

Autonomous Truck Technology Impacts

- RAC-identified top research priority for 2016
- Maps AV impacts to trucking industry's top concerns
 - ◆ HOS
 - ◆ CSA
 - ◆ Driver H/W
 - ◆ Congestion



2016 Top Industry Issues

1. ELD Mandate
2. Hours-of-Service
3. Cumulative Economic Impact of Trucking Regulations
4. Truck Parking
5. Economy
6. CSA
7. Driver Shortage
8. Driver Retention
9. Transportation Infrastructure/ Congestion/ Funding
10. Driver Distraction

CRITICAL ISSUES IN THE TRUCKING INDUSTRY – 2016



Presented to the
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Prepared by
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Top Issues Drivers vs. Carriers

Commercial Drivers

1. ELD Mandate
2. Hours-of-Service
3. Truck Parking
4. Cumulative Economic Impact of Trucking Regulations
5. Economy
6. CSA
7. Driver Retention
8. Sleep Apnea Rulemaking
9. FMCSA Mission
10. Driver Health/Wellness

Motor Carrier Execs

1. Driver Shortage
2. ELD Mandate
3. Cumulative Economic Impact of Trucking Regulations
4. Economy
5. Hours-of-Service
6. Driver Retention
7. CSA
8. Transportation Infrastructure/ Congestion/ Funding
9. Federal Preemption of State Regulation of Interstate Trucking (F4A)
10. Driver Distraction

Top Issues	Key Autonomous Truck Benefit
Hours-of-Service	Allows for driver rest and productivity to occur simultaneously.
Compliance, Safety, Accountability	Will decrease raw SMS scores, though percentile scoring needs to change.
Driver Shortage	Driving more attractive with higher productivity, less time away from home, and additional logistics tasks; fewer driver may be needed.
Driver Retention	Companies with autonomous technology may attract and retain drivers.
Truck Parking	If "productive rest" is taken in the cab during operations, less time will be required away from home at truck parking facilities and fewer facilities will be needed.
Electronic Logging Device Mandate	Modifications will be necessary depending on level of autonomy.
Driver Health and Wellness	Driver could be less sedentary; injuries could be reduced.
The Economy	Carriers that use AT may see productivity and cost benefits.
Infrastructure / Congestion / Funding	Urban congestion could be mitigated through widespread use of autonomous vehicles (including cars).
Driver Distraction	Drivers will not be distracted from driving if vehicle in autonomous mode.



PROUDLY BREWED.
SELF-DRIVEN.

Budweiser
OTTO

OTTO

**POPULAR
SCIENCE**

**“UBER FREIGHT GOES AFTER THE
TRUCKING BUSINESS”**

THE WALL STREET JOURNAL.

**“Uber's Otto hauls Budweiser across Colorado
in self-driving truck”**

“On Oct. 19, I was one of the biggest detractors of this technology,”
said Daniel Murray, vice president of research at the
American Transportation Research Institute, or [ATRI](#).

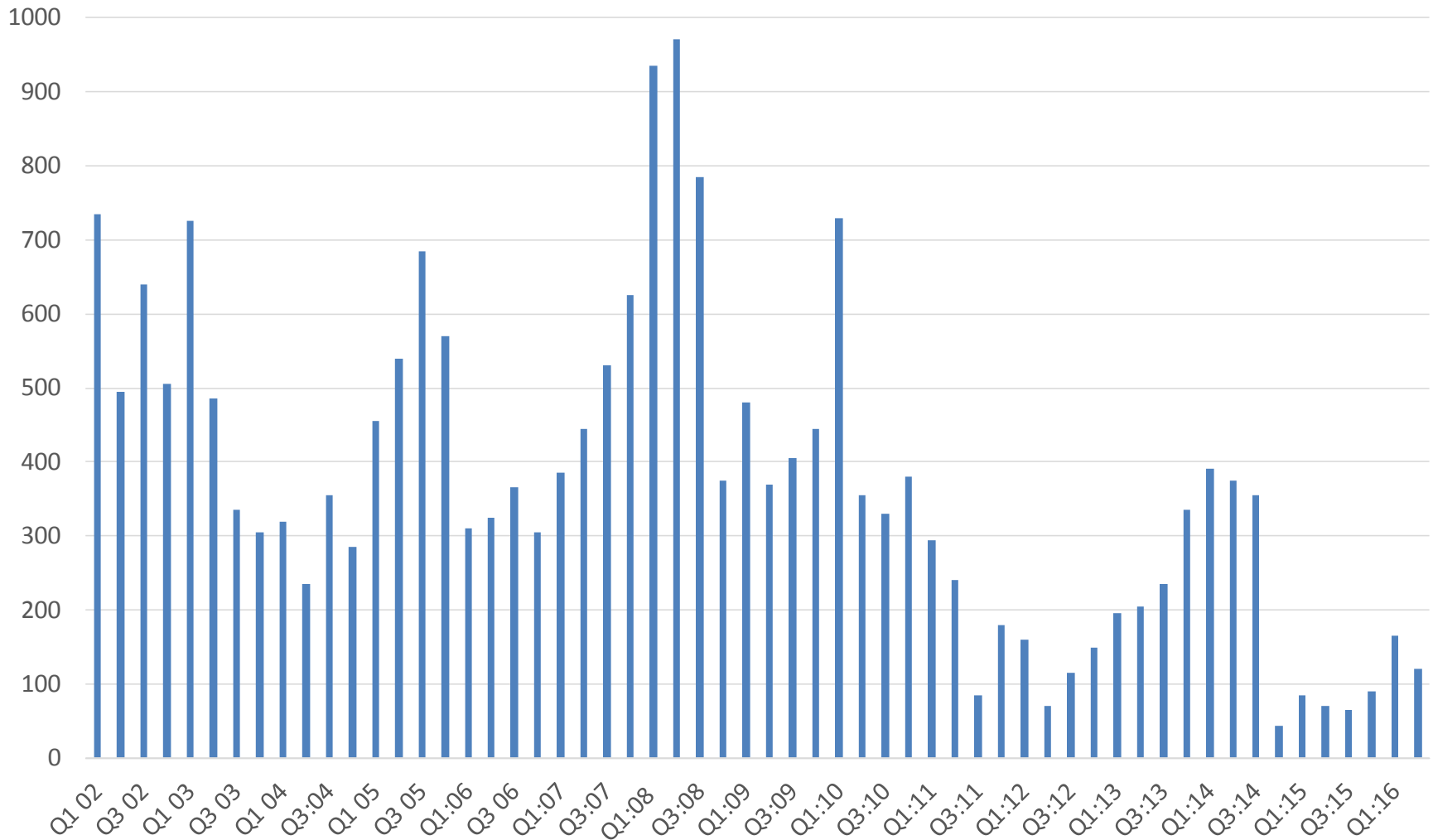
“On Oct. 20, I drank the Kool-Aid.”

The logo for USA Today, featuring a stylized globe icon to the left of the text "USA TODAY" in a bold, sans-serif font. The text is white and set against a blue rectangular background.

Safety Issues = Legal Issues...

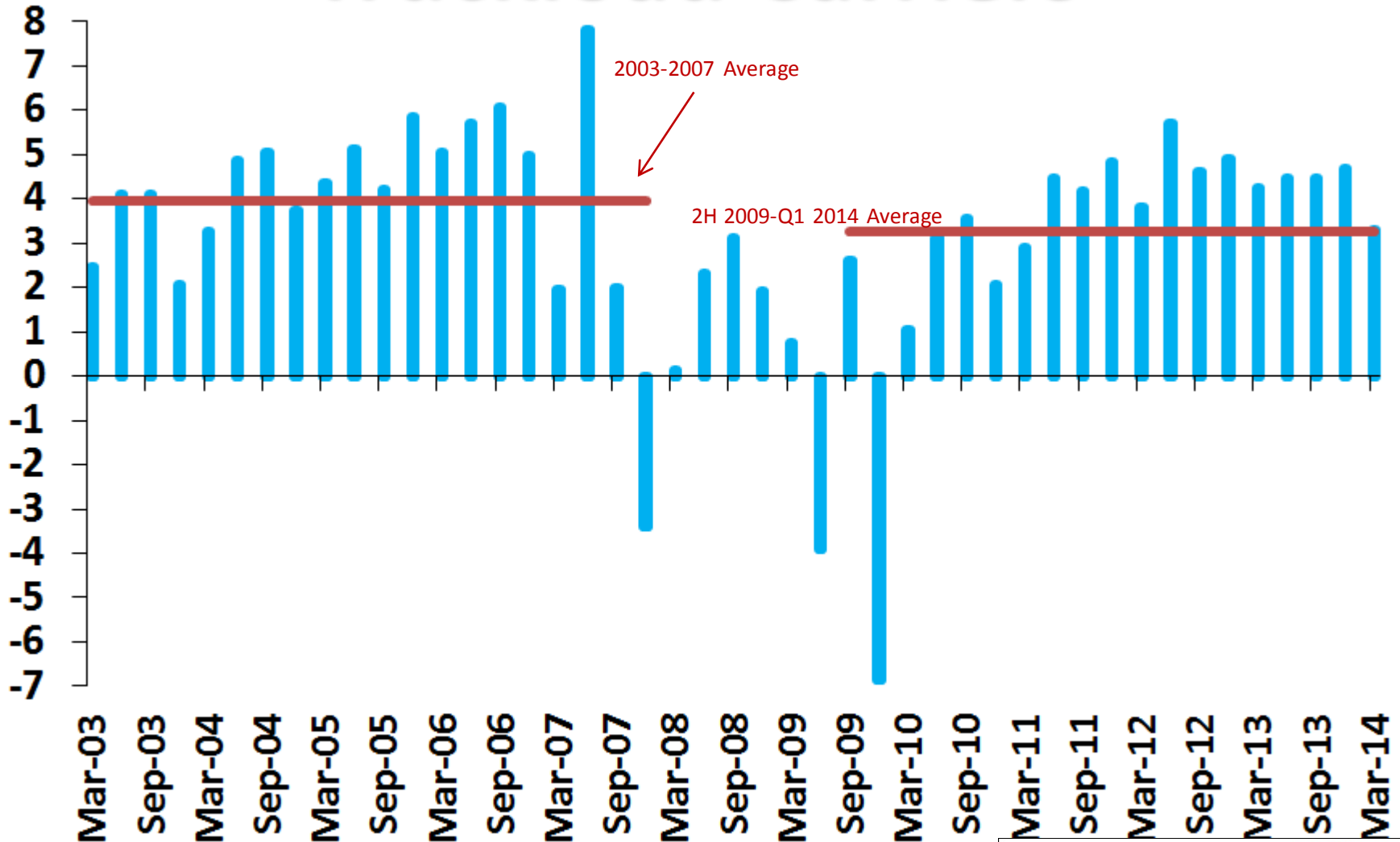
- Safety by the Numbers...
- Tort Issues will destroy the Best of Ideas
 - ◆ Negligence vs Liability
 - ◆ Drivers/Carriers to OEMs/Suppliers
- Insurance is King
- Please Define "Autonomous"
 - ◆ Reign in "driverless car" PR
 - ◆ Smart Trucks Already Exist
 - ◆ DATP for a Reason!
 - ◆ CV vs AV = 5.9 vs Better?
- ROIs & BCAs Will Solve All...

Trucking Failures Per Quarter



Profit Margins of Publicly Traded Truckload Carriers

Percent

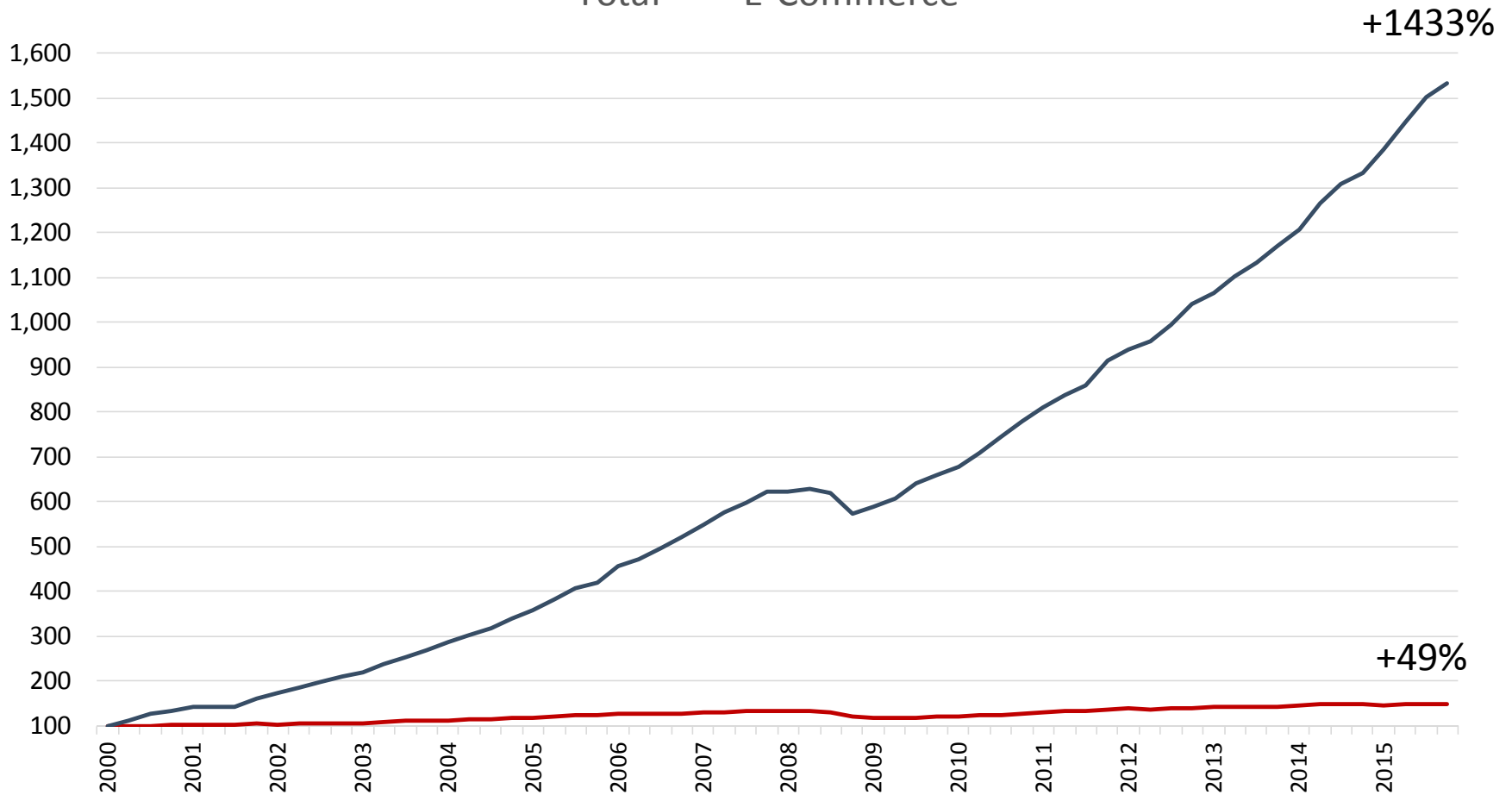


Source: ACT Research

Retail Sales

(Q1 2000 = 100)

— Total — E-Commerce



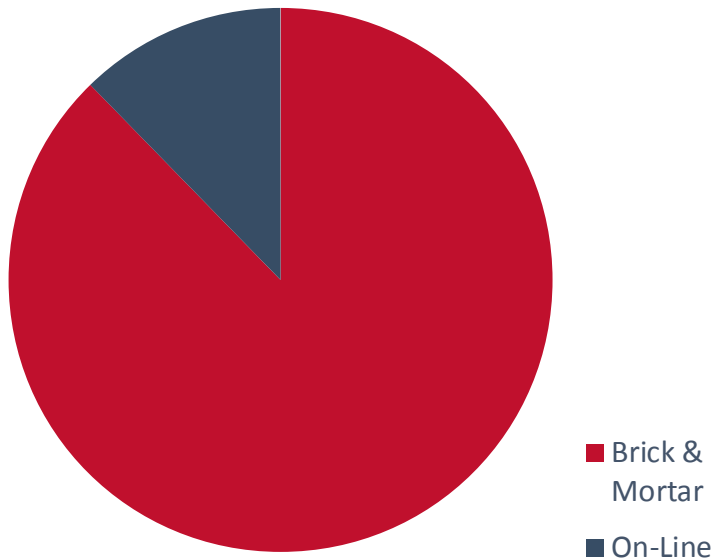
Source: Census Bureau



TRUCKING
Moves America Forward

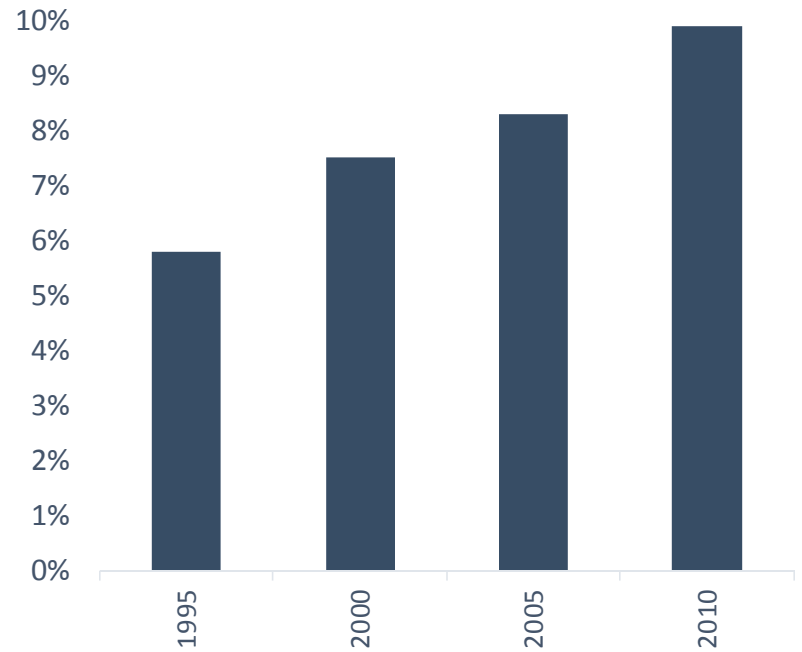
Retail Sales

Retail Sales (2016)



Brick & Mortar excludes auto sales and gasoline stations

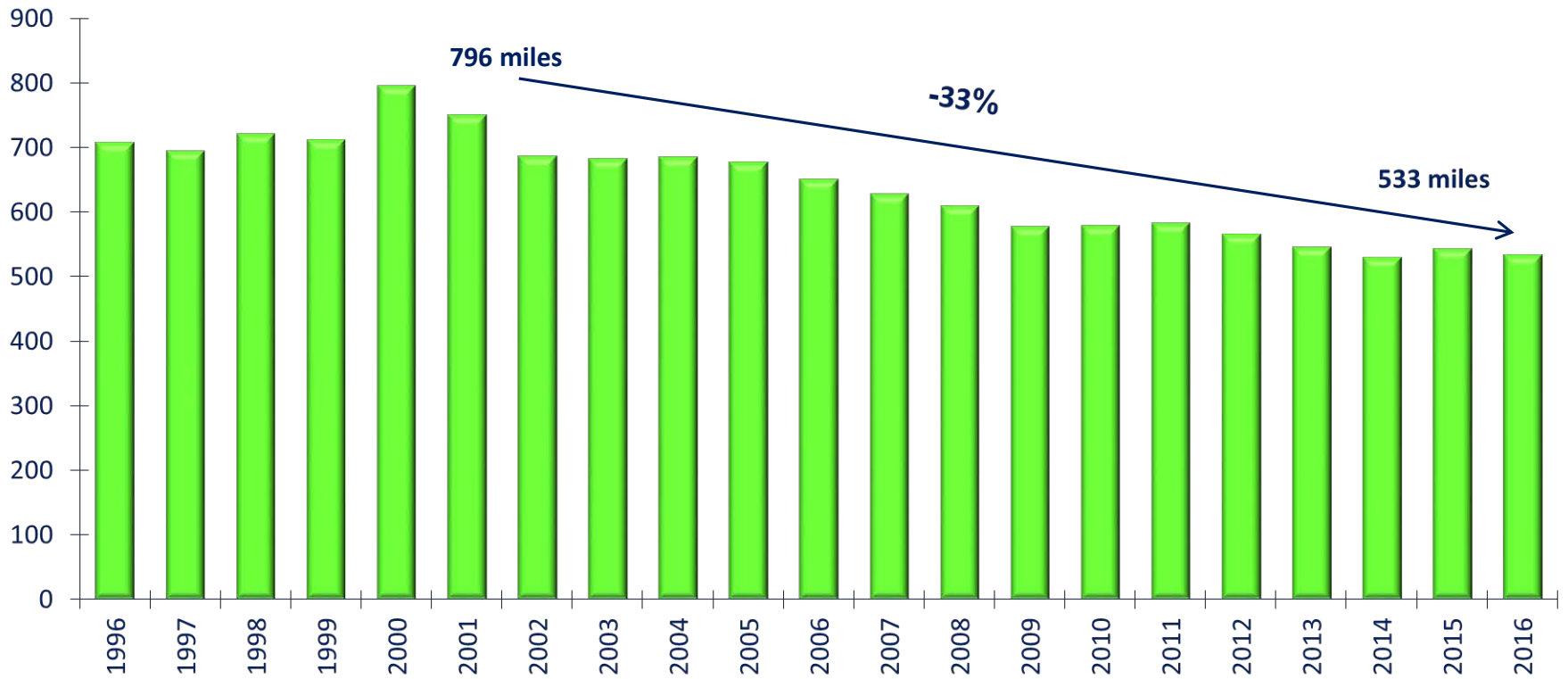
Percentage of On-Line Sales



On-line Sales have increased nearly 500% since 1995 versus 140% for core-retail sales.

Sources: Census Bureau & ATA

Dry Van Average Length-Of-Haul is Down



Source: ATA




Cost of Congestion

- Congestion on U.S. NHS cost trucking industry \$49.6B in 2014
- Lost productivity = 728 million hours
 - ◆ Equates to 264,500 commercial drivers sitting idle for entire year

Cost of Congestion to the Trucking Industry

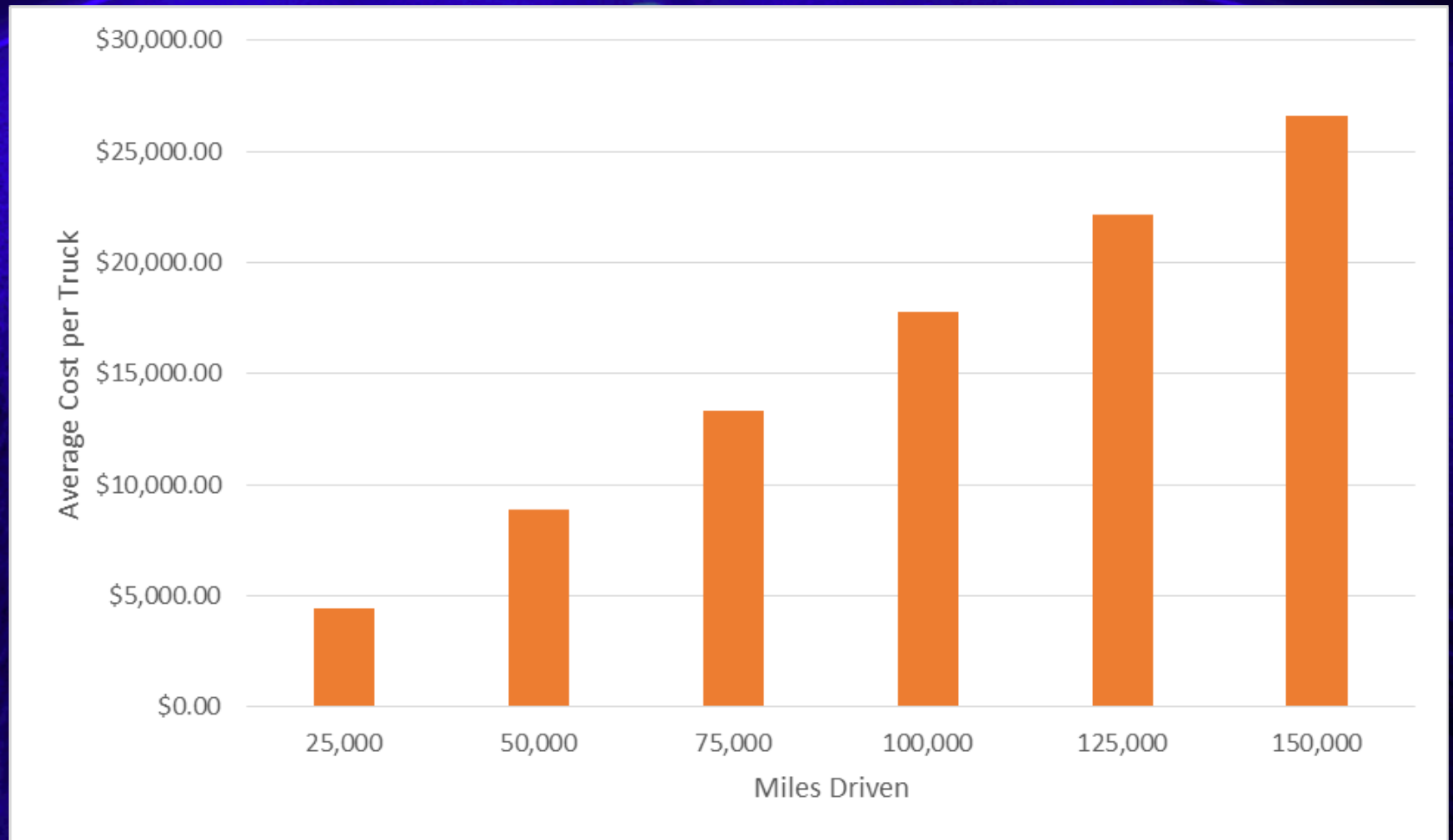
April 2016

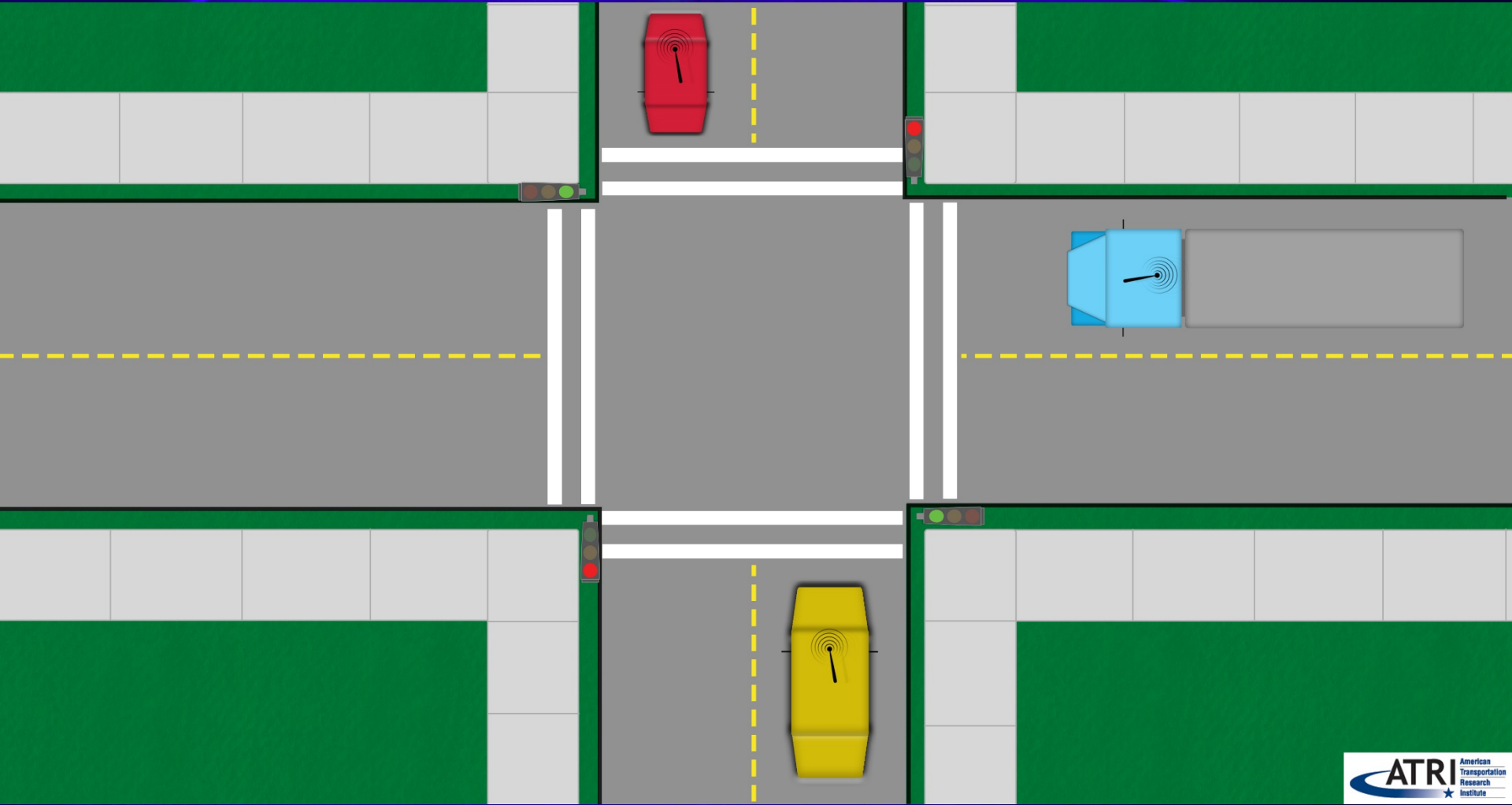


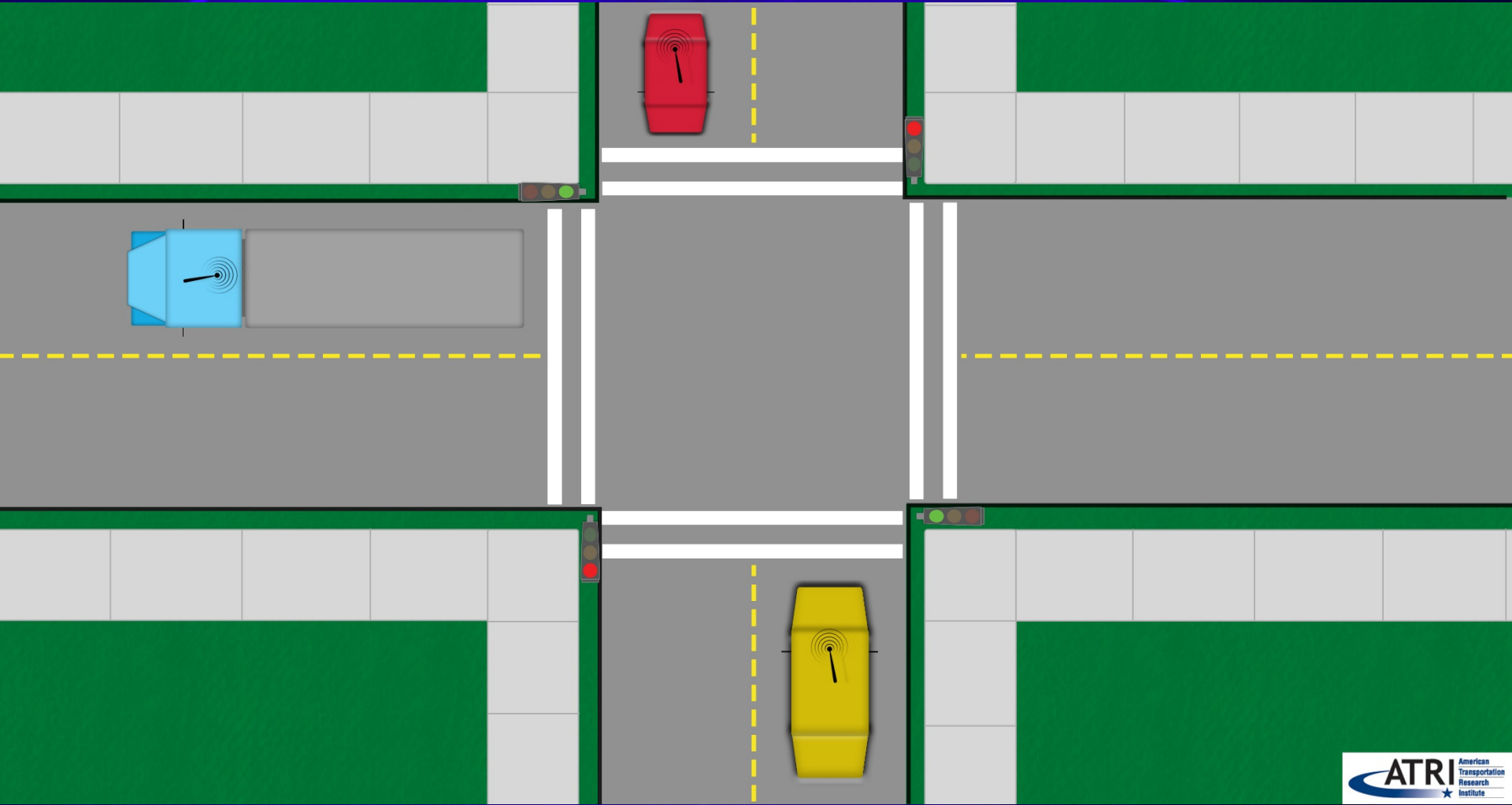
Prepared by the American Transportation Research Institute

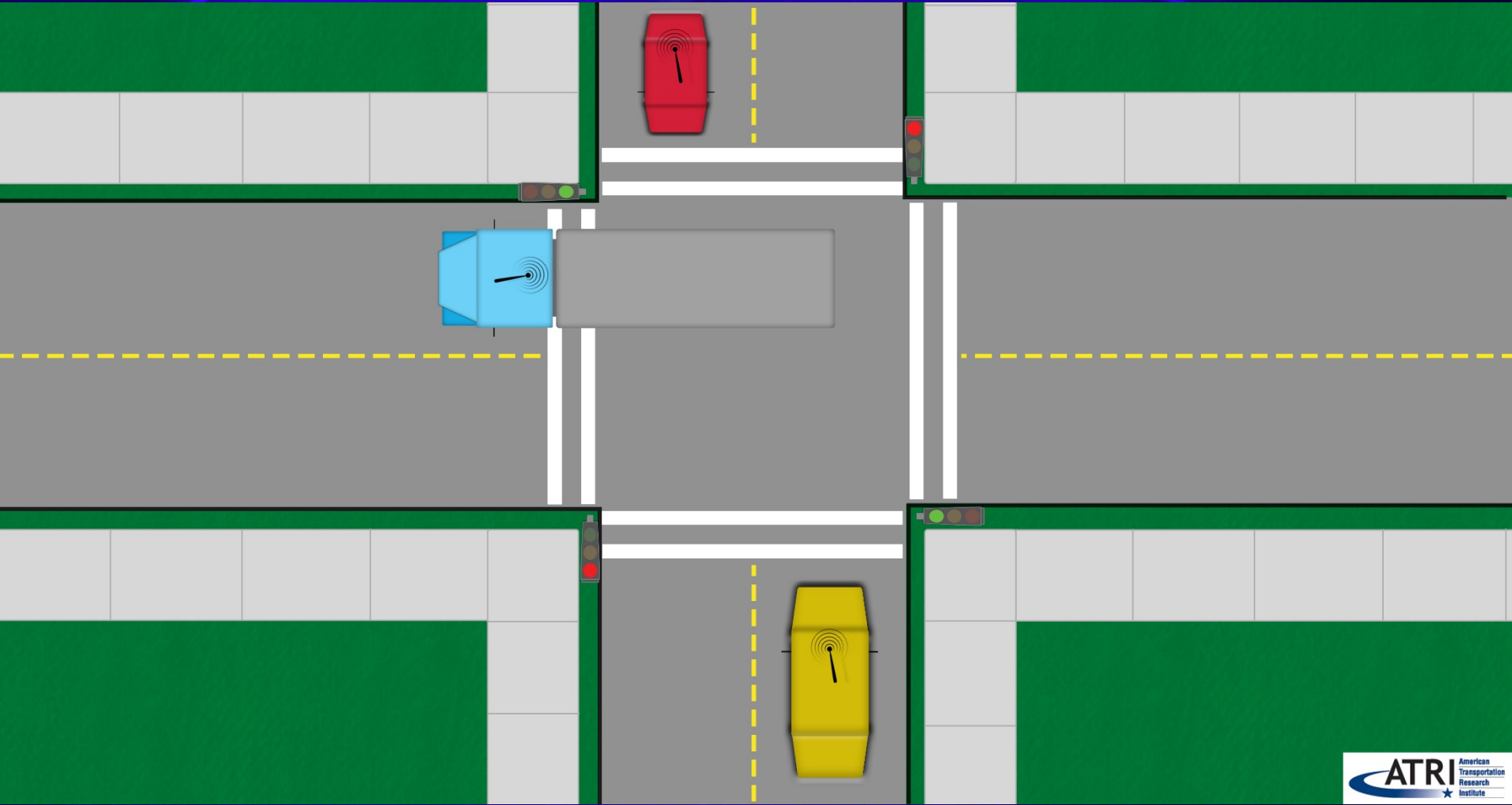
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Average Cost per Truck by Miles Driven

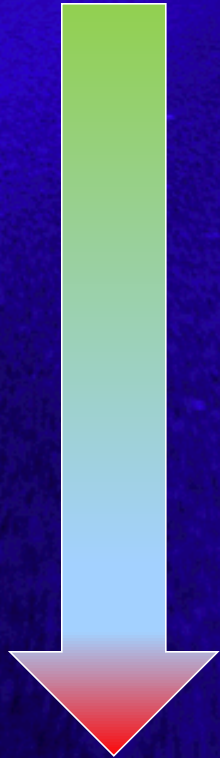








AVs: Low-Hanging Fruit?



- **Bus-Only Lanes**
 - **Industrial Applications**
 - **Truck Platooning**
 - **Industry Park Fleets**
 - **Level 3 Cars**
-
- **Consumer /Retail Drone Deliveries**

Questions?

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