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

Automated Commercial Motor Vehicles:
Potential Driver and Vehicle Safety Impacts

Office of Analysis, Research, and Technology
Federal Motor Carrier Safety Administration

Managing Fatigue Conference Mar 20 -23, 2017



Office of Research and Information Technology

FOR REFERENCE - WORKING SLIDE – CONFERENCE BULLETS

- Measuring fatigue and fatigue risk
- Fatigue detection and management technologies
- Operator workload, including distraction and drowsiness
- Cognitive and other performance effects, work accidents/incidents and commuting crashes
- 15 minutes presentation

Industry Demonstrations of Full Automation

- Freightliner
  - Continuing trials in Nevada
- Daimler
  - Platoons in live traffic
- Otto
  - Over the road demos
- Mobile Eye / Delphi
  - AV Package for OEMs
- Google
  - Patent for Self-delivery truck
- SMARTCOLUMBUS
  - Driver Assisted Truck Platooning

Platooning

- Level 2 - Driver-operated
- Following Drivers under lateral and longitudinal control.
  - Driver are “engaged”
- Under ideal conditions, platooning trucks can travel as close as 36 feet from each other.

Technical Challenges

- Public perception
  - Acceptance of an AV Truck (or *Multiple)*
- Human factors
  - Work load, distraction,
    Re-engagement to the driving task >>>
- Licensing
  - Autonomously Trained Driver?
- Safety
  - Must be no degradation in safety
  - Baseline Data to support safe over-the-road trials
- $ Cost / Benefit $ For Fleets

Technical and Policy Challenges - Continued

- Testing and certification complexity
- Harmonizing State and local regulations
- National Highway Traffic Safety Administration (NHTSA) mandates
- Federal Motor Carrier Safety Regulations (FMCSRs)
- HOS

Driver Re-Engagement

- When the system has to re-engage the driver…
- How quickly can a driver re-enter the dynamic situation?
  - 2 seconds? 4 seconds? 8 seconds?

>>>@ 88 Feet per Second<<<

- We need to understand what cognitive state the driver is in at any given time.
- Does the driver need “alertness assistance”?

FMCSA Projects

- Multi-Modal Driver Distraction and Fatigue Detection and Warning System
- Evaluation of Research on CMV Drivers with Moderate to Severe Obstructive Sleep Apnea
- Naturalistic Driving Research on Driver Fatigue
- Advanced Fatigue Modeling for Individual Differences

FMCSA Projects

- Review of Existing FMCSA Regulations for Potential Challenges with Automated Commercial Motor Vehicles
- Low-Speed Automated Truck Queue at Ports and Warehouses: (with MARAD)
  - Research related studies; feasibility; safety, driver, and operational benefits analyses.
- Commercial Motor Vehicle (CMV) Automated Vehicle Research:
  - Develop a research roadmap to better understand the impacts that this new technology will have on FMCSRs.
- Updates to FMCSRs Due to NHTSA's Electronic Stability Control (ESC) Mandate

FMCSA Policy Work and Stakeholder Interaction

- Draft policy to supplement NHTSA AV Policy
- Outreach and feedback
- ITF Forum Jan 2017
- Automation meeting Jan 2017
- CVSA Sessions (TBD April 2017)
- Possible Public Sessions

How Do We Inspect Advanced Technology?

VISUAL INSPECTION?

Mandates
- ABS
- ESC
- What's next?

Contact Information

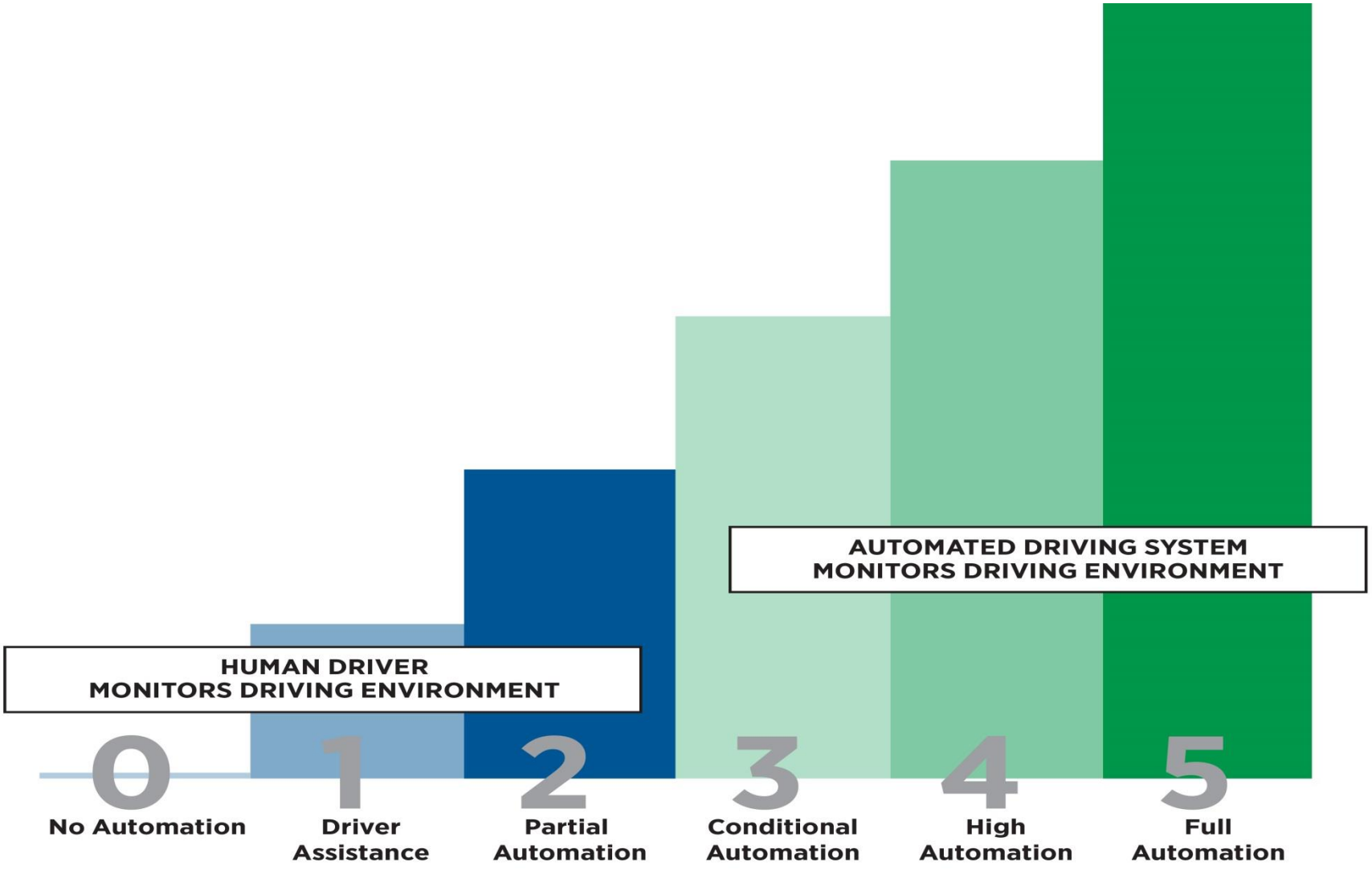
Dr Kelly Regal
Associate Administrator, Research and Information Technology
kelly.regal@dot.gov

Brian Routhier
Transportation Specialist
brian.routhier@dot.gov

EXTRA SLIDES FOLLOW

(use dependent on audience)

SAE Levels of Automation



FMCSA and International Transport Forum Roundtable

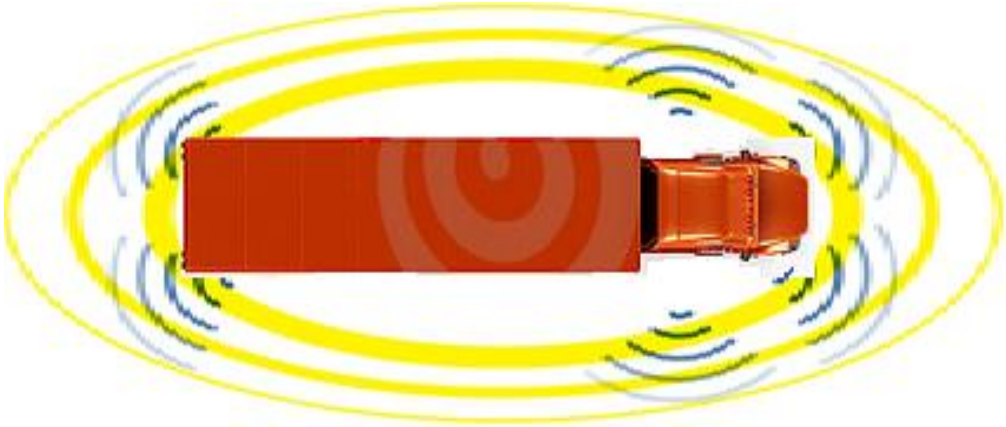
"Commercial Vehicle On-Board Safety Systems"

January 5-6, 2017, U.S. DOT Headquarters

- What CMV-specific technologies for automation exist?
- What are specific implications of the range of technology options on infrastructure requirements and human factors?
- How do these systems need to be regulated in order to allow safe operation?
- What are the policy implications of heavy vehicle automation in order to ensure safe operation?

Connected/Automated Vehicle

- Combining V2V and V2I with AV systems.



Connected Automated Vehicle

Leverages Autonomous and Connected Vehicle capabilities

Multi-Modal Work

"Development of a coordinated message on truck platooning research."

FHWA - NHTSA - FMCSA

FHWA Projects

- **Partial Automation for Truck Platooning:**
  - Prime Contractor: California Department of Transportation

- **Heavy Truck Cooperative Adaptive Cruise Control (CACC)**
  - Prime Contractor: Auburn University

- **ITS JPO**
  - ICF/Wyoming Pilot Deployment
  - **Objective**: Reduce the number and severity of adverse weather- related incidents (including secondary incidents) in the I-80 Corridor in order to improve safety and reduce incident-related delays.

Commercial Vehicle Automation Today: Level 2

- Automatic emergency braking (AEB) now required on heavy trucks in Europe.
- US Fleets are specifying:
  - Forward collision warning (FCW).
  - Lane departure warning (LDW).
  - Smart Cruise.
- Cars and light trucks
  - Automated braking by 2022
  - NHTSA estimates half of rear end collisions could be mitigated by AEB

NHTSA Policy

Figure I: Framework for Vehicle Performance Guidance