DISRUPTIVE FORCES AT WORK

We’re on the cusp of a transformation in transportation, driven by advances in vehicle Automation, Connectivity, Electrification and Sharing. The changes will be disruptive for transportation system design and operations.
CHALLENGE

• Integration of emerging transportation technologies into the existing operations environment
  • Long transition period
  • Uncertainty regarding:
    • Technologies
    • Resource needs
    • Standards
    • Business models
USDOT POLICY – AUTOMATED DRIVING SYSTEMS 2.0

• Vehicle Focused
  • Automated Driving Systems (ADS) designed for current Operational Design Domains (ODD)
  • Silent on need for new infrastructure standards and operations paradigms
  • Perpetuates silos between vehicle and infrastructure design
OPERATIONAL DESIGN DOMAIN

• USDOT Policy Minimums:
  • Facility Type
  • Geographic Area (Urban/Rural)
  • Speed Range of Vehicles
  • Environmental Conditions

• Let’s Add:
  • Level of Connectivity (V2X)
  • ITS and Traffic Management Infrastructure
  • Communications/Network Infrastructure
  • Electrification Infrastructure
  • Data Management Environment
  • Inter-Modality
  • MaaS Environment
  • Regulatory / Enforcement Considerations
  • Roadway Conditions
  • Mapping & Location Services
TRANSFORMATION OF THE DESIGN DOMAIN

• Collaborative, proactive approach needed to support emerging mobility solutions

• Understanding nuances of ADS behavior for safe transportation system design and operations

• Understanding ADS use cases to create an integrated environment for automated driving
DISRUPTION CREATES OPPORTUNITY
BUSINESS CASES FOR AUTOMATION

- Urban applications – shared use vehicles
- Intermodal facilities – first and last mile opportunities
- Residential and campus applications
- Highway maintenance operations
- Truck automation and platooning
AUTOMATED VEHICLE PROVING GROUNDS

- ADS test case validation
- Infrastructure test case development and validation
- Opportunity for collaboration among government, business and research communities
- Opportunity to design and test infrastructure and operations modifications for ADS

SunTrax Toll and CAV Test Facility, Lakeland FL
TRANSITIONING ON OUR HIGHWAYS

- Transition period will be challenging for operations
- Managed lanes in a new context
- Should we separate automated vehicles from others to generate the most benefits?
- At what penetration rate should we dedicate a lane?
- Incrementally increase the number of special lanes as the fleet turns over?
OPPORTUNITIES FOR CONNECTIVITY

• Data acquisition and management to support operations
• V2I applications for improved safety and mobility on freeways and arterials
• R.E.S.C.U.M.E. applications to support TIM and emergency operations
VEHICLE-TO-INFRASTRUCTURE HUB FRAMEWORK

Vehicle-to-Infrastructure (V2I) Hub Platform
Local interface system supporting collection, integration and dissemination of data between infrastructure and vehicles

Infrastructure Data and Display Systems

Vehicle and Nomadic Device Application Platforms

Traffic Management Entity
OPPORTUNITIES FOR ELECTRIFICATION

• Battery Enhancements
• Infrastructure Enhancements
  • Grid Modernization
  • Charging Stations
• Innovations
  • Wireless Induction
  • Dynamic Induction
  • Electrified Roadways
SHARED MOBILITY OPPORTUNITIES

• Integrated Intermodal Information and Payment Solutions

• Mobility Hubs
  • Centers for Shared Mobility Services
  • Design, Deployment, Operations

• Partnership and Integration with Transit
  • Off-Peak Solutions
  • First and Last Mile Solutions
  • Lesser Used Routes
INFRASTRUCTURE IMPACTS

- The “Automated Highway”
  - Integrating automation into design and operations
  - Automated control functions (signs, signals, markings, lane controls, barriers)
  - Automated payment systems

Source: University of Texas
WHAT’S NEXT?

Flying cars, “mobile homes” and riding in tubes at the speed of sound
EMERGING MOBILITY SOLUTIONS

- Integration of automated, connected, electric and shared vehicles into the existing design and operations environment will be challenging.
- Engineering and operational concepts, performance measures, algorithms, the transportation workforce, design standards, traffic control systems, and policies will be transformed.
- We must be collaborative, nimble and resourceful.

Above all, we must be proactive.