Presentation Objectives

- What is the outlook for introduction of automated vehicle (AV) technology and other emerging technologies by public transit agencies?
- What are the opportunities and challenges for transit systems?
- What actions can transit planners take to prepare for the future?
NCHRP 20-102 (02): Impacts of Laws and Regulations on CV and AV Technology Introduction in Transit Operations

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Explores potential barriers imposed by operating authority policies, agency regulations, and governmental laws relative to the transit environment.
Automated Vehicles Are Not New to Transit

Fully automated, driverless trains have been serving passengers safely:

» Morgantown and Miami Metromover People Movers
» Multiple airport tram/people mover systems
» Vancouver Sky Train
» Multiple examples in Asia and Europe (Copenhagen, Singapore)
… but Today’s Automated Vehicles Don’t Need Tracks

- Driverless vehicles capable of sensing their environment and navigating without full human input utilizing GPS, radar and Lidar technology

- Multiple driverless shuttle applications in development

Source: 2014 Challenge Bibendum
Other Related Trends and Technologies Shaping Mobility

- Real-Time Traveler Information and Trip Planning
- Connected Vehicles & Smart Infrastructure
- Alternative Energy
- Shared Mobility
- Microtransit and On-Demand Services
Potential Evolution of Technology Deployment (Near/Mid-Term)

- Operation of automated buses as they travel along dedicated transitways:
  - Bus rapid transit (BRT)
  - HOV/Managed lanes
  - Bus on shoulder

- Over medium term, these dedicated lanes could be open to public transit buses as well as private AV automobiles

- Deployment of AV buses in campus-like settings where there is a semi-controlled environment in which vehicles can operate at relatively slow speeds
Potential Evolution of Technology Deployment (Long-Term)

- Conversion of high-capacity fixed guideway LRT/BRT systems to multiple physically or virtually entrained AV rubber-tire roadway transit vehicles
- Automated transit vehicles operating in mixed-traffic environment
- Future transit systems that respond dynamically to changing demand patterns
  - No longer require long trains operating on fixed routes that stop at all stations
Potential Barriers to AV Deployment for Public Transit

- Public concerns and opposition
- Funding the costs of technology
- Safety and risk management
- Legal/regulatory barriers
  - Americans with Disabilities Act
  - Title VI of the Civil Rights Act
  - Section 13c Requirements of the Federal Transit Act (labor)
- Public-private and interagency coordination/cooperation
- Equity concerns
Impacts on Workforce Deployment

- New roles for human drivers/operators
- OCC/Dispatcher – Continual monitoring by Operations Control Center (OCC)
- Roving operations personnel to provide rapid response to vehicle failures and passenger incidents
- Passenger assistance – remote or in stations
- Maintenance workforce needed to support larger fleet of smaller vehicles
Policy and Planning Considerations

- Dedicated right-of-way or mixed-traffic operations
  - Conflicts with pedestrians and cyclists, illegally parked vehicles, and turning vehicles

- Investment in flexible infrastructure

- First mile/last mile access and land use implications

- Operating cost savings – can more service be provided at a lower cost?

- Impacts on traffic congestion and VMT
Next Steps for Transit Planners

- **Strategic planning**
  - Developing or revising strategic visions to consider potential changes to service delivery
  - Identifying opportunities and threats posed by the new technology
  - Identifying potential strategies for managing the changes

- **Regional planning and coordination**
  - Infrastructure requirements and capital improvement needs
  - Long-range financial impacts

- **Scenario planning –** understanding long-term needs given uncertainty about the future
Scenario Planning

- **TODAY**
  - **POINT FORECAST**
    Planning for a short term point in time.
  - **RISK MANAGEMENT**
    Identifying and planning for both short and medium term risks.
  - **SCENARIO PLANNING**
    Looking out decades and letting the future drive the planning.

- **PLANNING HORIZON**
  - **FUTURE 1**
  - **FUTURE 2**
  - **FUTURE 3**
Questions?

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