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Think Forward

Introducing AV Technology in Transit Operations: Challenges and Opportunities

presented to

2018 APTA Sustainability and Multimodal Planning Workshop

presented by

Cambridge Systematics, Inc.

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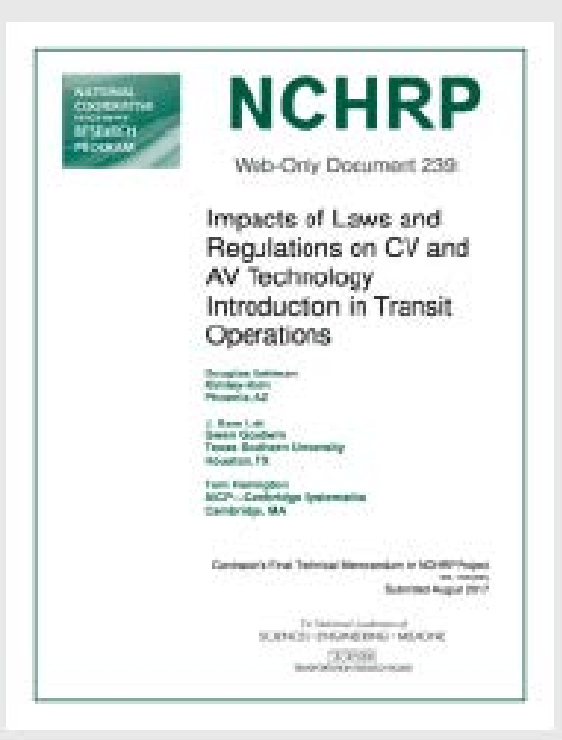
Presentation Objectives

- 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 Web-Only Document 239



NCHRP 20-102 (02): Impacts of Laws and Regulations on CV and AV Technology Introduction in Transit Operations

Research Team:

- Douglas Gettman, Kimley-Horn
- Sam Lott, Texas Southern University – Principal Investigator
- Tom Harrington, Cambridge Systematics

- 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)

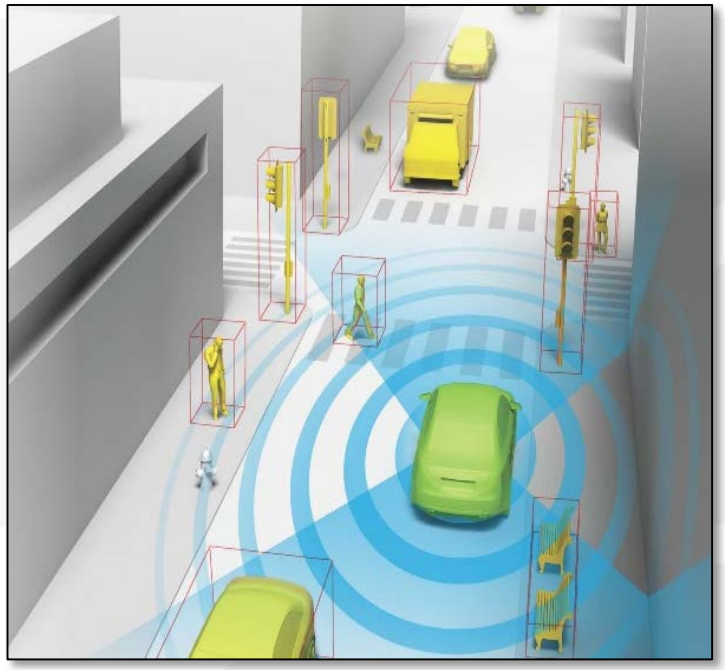
… but Today's Automated Vehicles Don't Need Tracks

- 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



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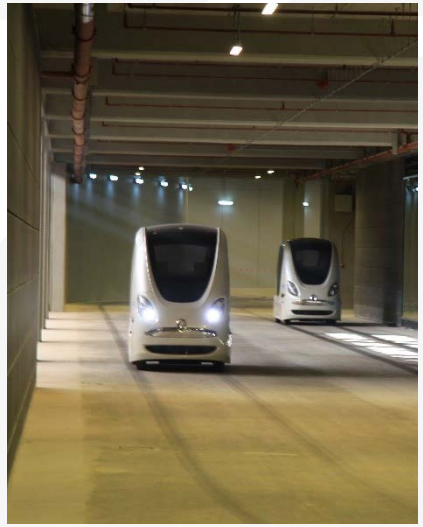
Potential Evolution of Technology Deployment (Near/Mid-Term)

- 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

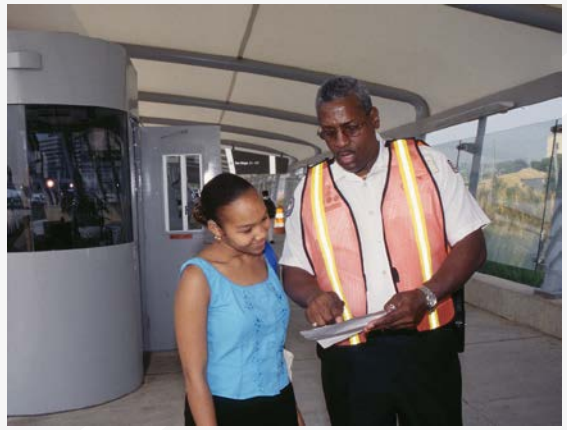


Potential Barriers to AV Deployment for Public Transit

- 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



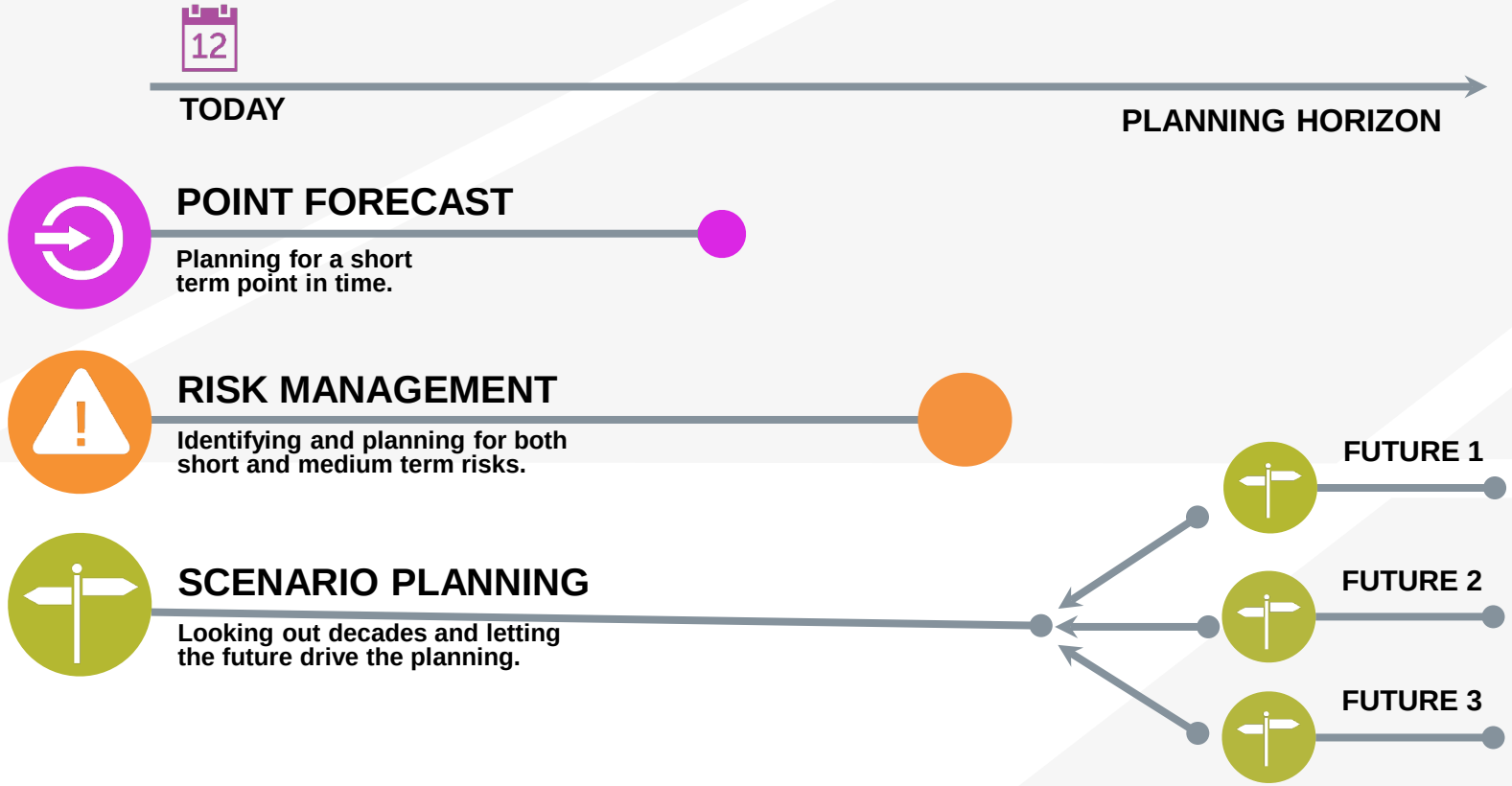
Policy and Planning Considerations

- 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



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Questions?

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