Virginia Department of Rail and Public Transportation (DRPT) Technology Initiatives

Presented to:
Hampton Roads Transportation Planning Organization (HRTPO) Transportation Technical Advisory Committee (TTAC)

April 5, 2016
• Impact of Technology

“Cities will reconsider how space is utilized and how public transit is provided.”
– Federal Automated Vehicles Policy, September 2016 (p. 6)
EFFORTS AT THE FEDERAL LEVEL

• USDOT Transit V2I Research
  – Transit Vehicle-to-Infrastructure (V2I) Assessment Study (Jul 2015)
  – National ITS Architecture
  – Federal Automated Vehicles Policy (Sept 2016)
EFFORTS AT THE STATE LEVEL

• CTB Innovation and Technology Committee
  – Initiatives to support and accelerate deployment of AVCV
• Virginia Automated 20XX
DRPT’S ROLE

• DRPT’s Role in Transit in Virginia
  – Funding
  – Development of SYIP
    • Planning and prioritization
  – Knowledge dissemination
    • Promote best practices
  – Development of tools and methods
  – Make available technical expertise
  – Legislative support
DRPT’S ROLE

• Challenges for DRPT
  – Some of the technology is not deployment-ready
  – Need and benefits are unclear
    • What is the problem that we are trying to solve?
    • Is it worth the investment?
    • What do we gain or lose by being early adopters?
    • How do these initiatives fit in the overall picture?
    • How do we address competing demands (e.g. today’s needs vs. aspirational projects)
SEARCH FOR FAVORABLE COST-BENEFIT EQUATION

- Bus Transit is Three Times Safer than Travel by Car
  - However, travel by bus can be made even safer
- Reduce human and operations (insurance) cost

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<thead>
<tr>
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<tbody>
<tr>
<td></td>
<td>Collisions</td>
<td>Fatalities</td>
</tr>
<tr>
<td>Bus, Demand Response, and Van Pool</td>
<td>85,391</td>
<td>1,340</td>
</tr>
<tr>
<td>Rail</td>
<td>6,118</td>
<td>1,303</td>
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# Transit Driver Assistance Systems

<table>
<thead>
<tr>
<th>SAE Level</th>
<th>Name</th>
<th>Narrative Definition</th>
<th>Execution of Steering and Acceleration/Deceleration</th>
<th>Monitoring of Driving Environment</th>
<th>Fallback Performance of Dynamic Driving Task</th>
<th>System Capability (Driving Modes)</th>
</tr>
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<tbody>
<tr>
<td><strong>0</strong></td>
<td>No Automation</td>
<td>the full-time performance by the human driver of all aspects of the dynamic driving task, even when enhanced by warning or intervention systems</td>
<td>Human driver</td>
<td>Human driver</td>
<td>Human driver</td>
<td>n/a</td>
</tr>
<tr>
<td><strong>1</strong></td>
<td>Driver Assistance</td>
<td>the driving mode-specific execution by a driver assistance system of either steering or acceleration/deceleration using information about the driving environment and with the expectation that the human driver perform all remaining aspects of the dynamic driving task</td>
<td>Human driver and system</td>
<td>Human driver</td>
<td>Human driver</td>
<td>Some driving modes</td>
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<tr>
<td><strong>2</strong></td>
<td>Partial Automation</td>
<td>the driving mode-specific execution by one or more driver assistance systems of both steering and acceleration/deceleration using information about the driving environment and with the expectation that the human driver perform all remaining aspects of the dynamic driving task</td>
<td>System</td>
<td>Human driver</td>
<td>Human driver</td>
<td>Some driving modes</td>
</tr>
<tr>
<td></td>
<td><strong>Automated driving system (“system”) monitors the driving environment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>3</strong></td>
<td>Conditional Automation</td>
<td>the driving mode-specific performance by an automated driving system of all aspects of the dynamic driving task with the expectation that the human driver will respond appropriately to a request to intervene</td>
<td>System</td>
<td>System</td>
<td>Human driver</td>
<td>Some driving modes</td>
</tr>
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<td><strong>4</strong></td>
<td>High Automation</td>
<td>the driving mode-specific performance by an automated driving system of all aspects of the dynamic driving task, even if a human driver does not respond appropriately to a request to intervene</td>
<td>System</td>
<td>System</td>
<td>System</td>
<td>Some driving modes</td>
</tr>
<tr>
<td><strong>5</strong></td>
<td>Full Automation</td>
<td>the full-time performance by an automated driving system of all aspects of the dynamic driving task under all roadway and environmental conditions that can be managed by a human driver</td>
<td>System</td>
<td>System</td>
<td>System</td>
<td>All driving modes</td>
</tr>
</tbody>
</table>

Source: SAE International and J3016
DRPT’S DEMONSTRATION PROJECT

• Approach – Modeled after a Program in Washington State
  – Solicit interest from transit agencies
  – Potentially collaborate with Virginia Transit Insurance Pool
  – Evaluate feasibility of proposals
  – Provide higher than usual state match
    • Work towards “Vision Zero”
    • Develop and prepare transit workforce
OTHER INITIATIVES

• **Support CTB’s Data Warehousing Effort**
  - Develop and/or make available transit datasets
    - GTFS
    - Fleet information
    - Real-time transit vehicle occupancy
    - Real time vehicle location and movement
  - Deployment of automated vehicles
    - Utilize dedicated transit right-of-way
    - Repurpose existing lanes
OTHER APPLICATIONS OTHER CONSIDERATION

- Red Light Violation Warning (Angle Crashes at Signalized Intersections)
- Stop Sign Violation Warning (Angle Crashes at Non-Signalized Intersections)
- Left-Turn Assist (Head-on Crashes at Intersections with Permissive Phase)
- Stop Sign Gap Assist
- Spot Weather Information Warning
- Transit Bus–Pedestrian / Cyclist Crossing Warning
- 3D Intersection Mapping for Collision Avoidance and Situational Awareness
- Transit Bus Stop Pedestrian Safety
- Reduced Speed Zone Warning
- Transit Vehicle and Center Data Exchange
- Transit Traveler Information Infrastructure
- Portable Infrastructure

Source: Transit Vehicle-to-Infrastructure (V2I) Assessment Study (Jul 2015)
SUMMARY

• Contact us if you have an idea or are interested
• Great potential for transit in V2I applications
  – Solve today’s problem using technology of tomorrow
• Consider transit applications in your projects