

AVS 2018 Breakout Session #21

FTA's Strategic Transit Automation Research (STAR) Plan

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Automation Benefits in Public Transportation

- Improve safety
- Increase efficiency and productivity
- Potentially reduce costs
- Increase traveler convenience and comfort through improved service frequency, flexibility and reliability
- Expand service hours and area
- Increase overall customer satisfaction

Transit Automation Research Goals

- **Conduct enabling research** to achieve safe and effective transit automation deployments
- **Identify and resolve barriers** to deployment of transit automation
- **Build awareness** to socialize automation for transit stakeholder community
- **Demonstrate market-ready technologies** in real-world settings
- **Leverage technologies** from other sectors to move transit automation industry forward

STAR Plan Scope

- Transit bus operations
 - “Bus” is defined broadly
 - Passenger capacities
 - Traditional and novel vehicle designs
 - Lessons learned from automation in rail, light-duty vehicles, commercial vehicles, and aviation considered
- Full range of automation (SAE Levels 1-5)
 - Does not include driver assistance systems without an automation aspect (e.g., driver warnings and alerts)



STAR Plan Development Process

Engage stakeholders

- Interviews, workshops, and presentations

Identify potential scenarios (use cases)

- Identify, analyze, and prioritize use case scenarios for automating transit bus operations

Develop a plan

- For future transit automation development and demonstration projects

Major Project Tasks

- Literature Review
- Risk/Barrier Assessment
- Stakeholder Engagement
- Benefit-Cost Analysis
- **Research Plan**

Transit Automation Scenarios (Use Cases)

- Smooth Acceleration and Deceleration
- Automatic Emergency Braking and Pedestrian Collision Avoidance
- Curb Avoidance
- Precision Docking
- Narrow Lane/Shoulder Operations
- Platooning

- Circulator Bus Service
- Feeder Bus Service

- Precision Movement for Fueling, Service Bays, and Bus Wash
- Automated Parking and Recall

- Automated First/Last-mile
- Automated ADA Paratransit
- On-Demand Shared Ride

- Automated BRT

Transit Bus Advanced Driver Assistance System (ADAS) (L1-2)

Automated Shuttle (L4)

Maintenance, Yard, Parking Operations (L4)

Mobility-on-Demand (MOD) Service (L5)

Automated Bus Rapid Transit (L4)

Key Findings

- The transit industry is increasingly interested in the potential applications and benefits of automation.
- Investment in automated transit application development and deployment has been relatively modest.
- Transit agencies face many potential barriers to automation (legal, financial, and institutional), in addition to technical challenges.
- Federal investment in transit automation can accelerate adoption.

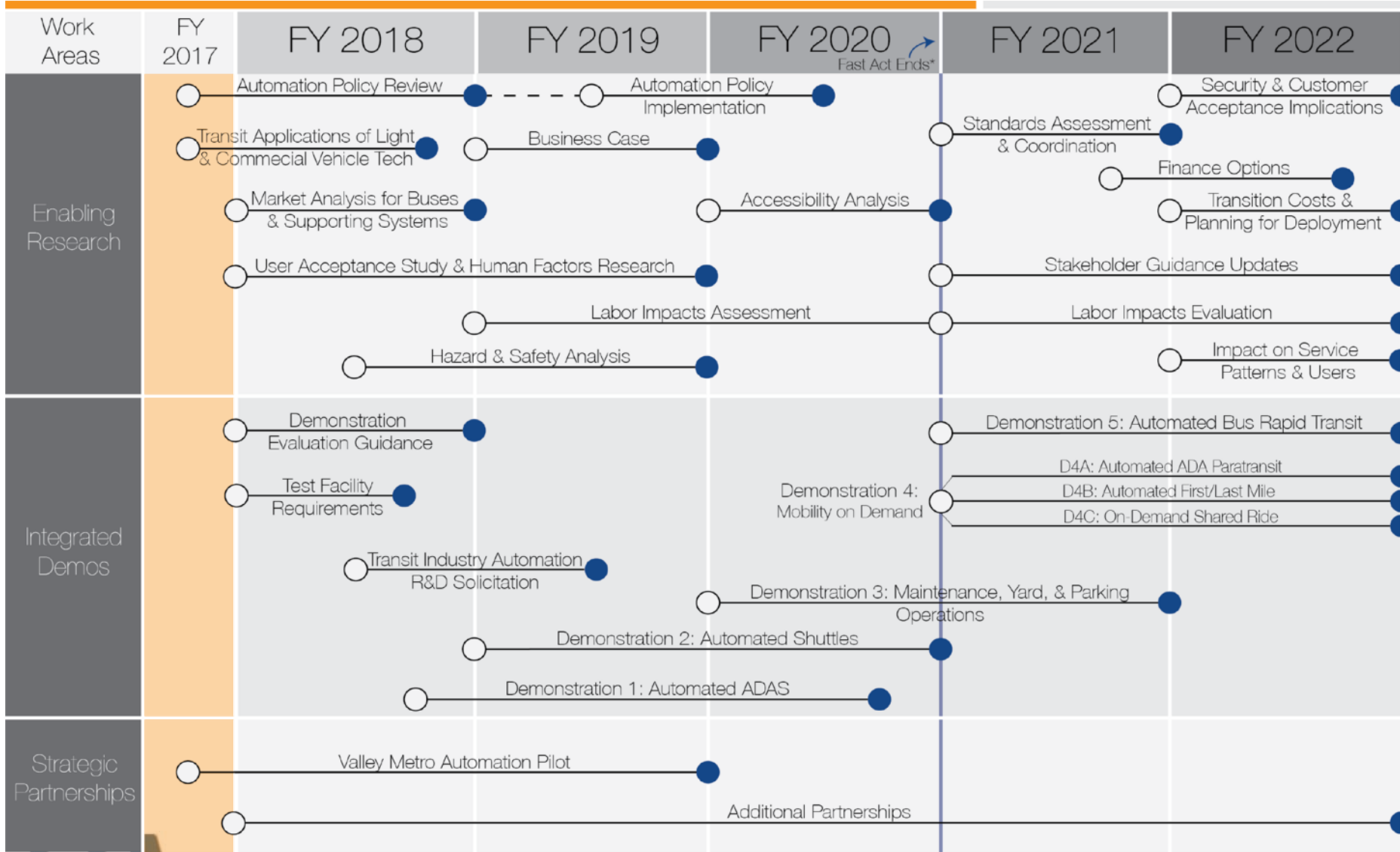
STAR Plan

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Strategic Transit Automation Research



Knowledge Transfer, Stakeholder Engagement, & Technical Assistance



Additional Information

- **Talking Technology and Transportation (T3) Webinar: Introducing FTA's STAR Plan** https://www.pcb.its.dot.gov/t3_webinars.aspx
- **FTA Website: Transit Automation Research** <https://www.transit.dot.gov/automation-research>
- **USDOT Website: Automated Vehicles Activities** <https://www.transportation.gov/AV>

Transit Bus Automation Overview

What is an Automated Bus?

The Federal Transit Administration (FTA) is exploring the use of automation technologies in transit bus operations. These technologies enable systems in which the control of vehicle control (e.g., steering or speed control) occurs without direct driver input. This could enable driver assistance features like lane keeping, precision docking and automatic emergency braking in the future, or may see more flexible and diverse transit services through fully automated buses.

Benefits

- Potential benefits of transit bus automation include:
 - Safety and reduced injuries: Automation may increase safety by reducing the severity and frequency of crashes, thereby reducing agency liability and other related costs.
 - Operations and Maintenance: Agencies may realize operations and maintenance savings from changes in workload needs, decreased vehicle wear, and increased efficiency (e.g., bus yard operations).
 - Environmental Impact: Fuel savings may reduce routing and smoother acceleration and deceleration may reduce a vehicle's environmental impact.
 - Service Availability and Operational Efficiency: New transit services, such as shuttles or solo night service, or operations in low-density areas, may become cost effective, improving transit access.
 - Passenger Experience: Automation may improve service reliability and address enhancing rider experience.
 - Other Street and Workload: Other assistance systems may reduce other stress and workload, resulting in safer systems and more satisfied drivers.

Challenges

Potential challenges to transit bus automation may include:

- Public Acceptance: Whether the public accepts transit bus automation remains uncertain. Lack of significant public acceptance could delay the deployment of automated services across the transit industry.
- Agency Acceptance: Transit agencies may be reluctant to implement automation technology until they are certain it will meet the needs of all agency stakeholders (e.g., riders, workers, etc.).
- Labor Impact: Automation technology may impact agency workers, which may result in shifting duties away from their operation.
- Capital Investment: Without additional funding, agencies may not be able to purchase or retrofit facilities and equipment that support automation. Investment requirements may present an additional challenge.
- Insurance and Technology Acquisition: Many products are unproven and untested, or may not fully meet the needs of transit agencies. Further research and development of products and technologies may be required.
- Safety and Security: Agencies may be reluctant to deploy automated systems until clear procedures for ensuring safety and security are developed.

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Enabling Technologies for Bus Transit Automation

OPERATIONAL CHALLENGES AND AGENCY INTERFACES

ACTIVITIES

FTA STRATEGIC RESEARCH PLAN

RESEARCH CHALLENGES

LOCALIZATION AND CHALLENGES

AGENCY INTERFACES AND AGENCY POINTS OF CONTACT

FTA Strategic Transit Automation Research Plan

To facilitate automation in bus transit and mitigate the challenges, FTA has developed a Strategic Transit Automation Research Plan that identifies research gaps and outlines a strategy involving the integration of the public sector, private sector, and academia. The plan will address the following identified research areas:

- **Enabling Research**: To accelerate the ability of manufacturers, suppliers, and transit providers to adopt and integrate automation technologies, transit providers and manufacturers must continue to share data, and address the key challenges.
- **Integrated Demonstrations**: To generate industry and expand knowledge gaps for demonstrating market readiness for transit automation, transit providers and manufacturers must demonstrate and evaluate new automation capabilities.
- **Strategic Partnerships**: To improve quality of research by others and disseminate findings to the transit community, transit providers and manufacturers must engage in strategic partnerships and participation of providers and suppliers.

Contact
For more information, visit <https://www.fta.gov> or contact FTA's Office of Research, Development, and Innovation:
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