FTA RESEARCH

FEDERAL TRANSIT ADMINISTRATION

FTA's Strategic Transit Automation Research (STAR)

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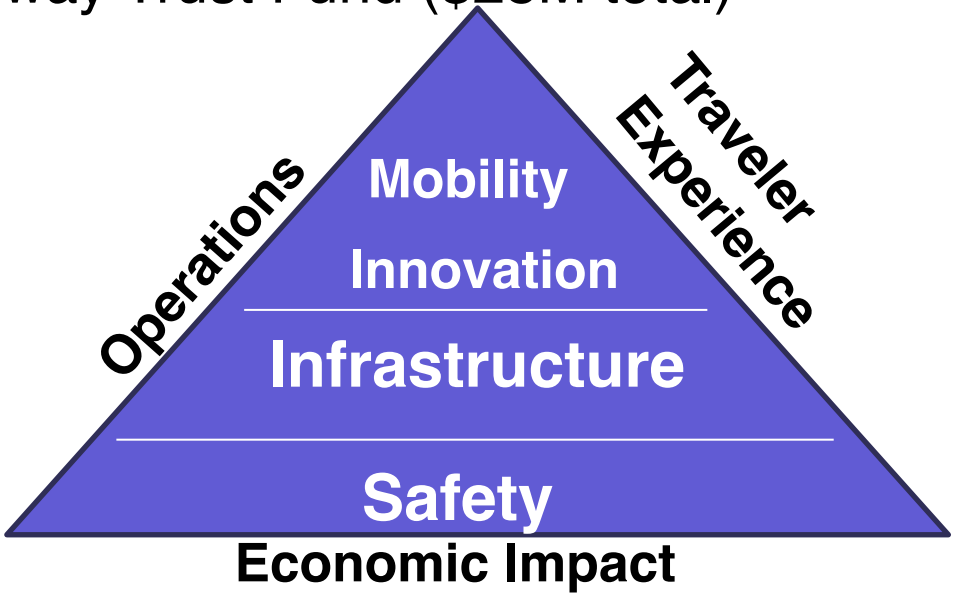
U.S. Department of Transportation
Federal Transit Administration

Federal Public Transportation Law
(49 U.S.C. §5312) Statutory Authority

- **Purpose:** To advance innovative public transportation research and development
- **Eligible activities promote "pipeline approach"** Innovation and Development; Demonstration & Deployment; Project Evaluation
- **Funding**: Highway Trust Fund ($28M total)

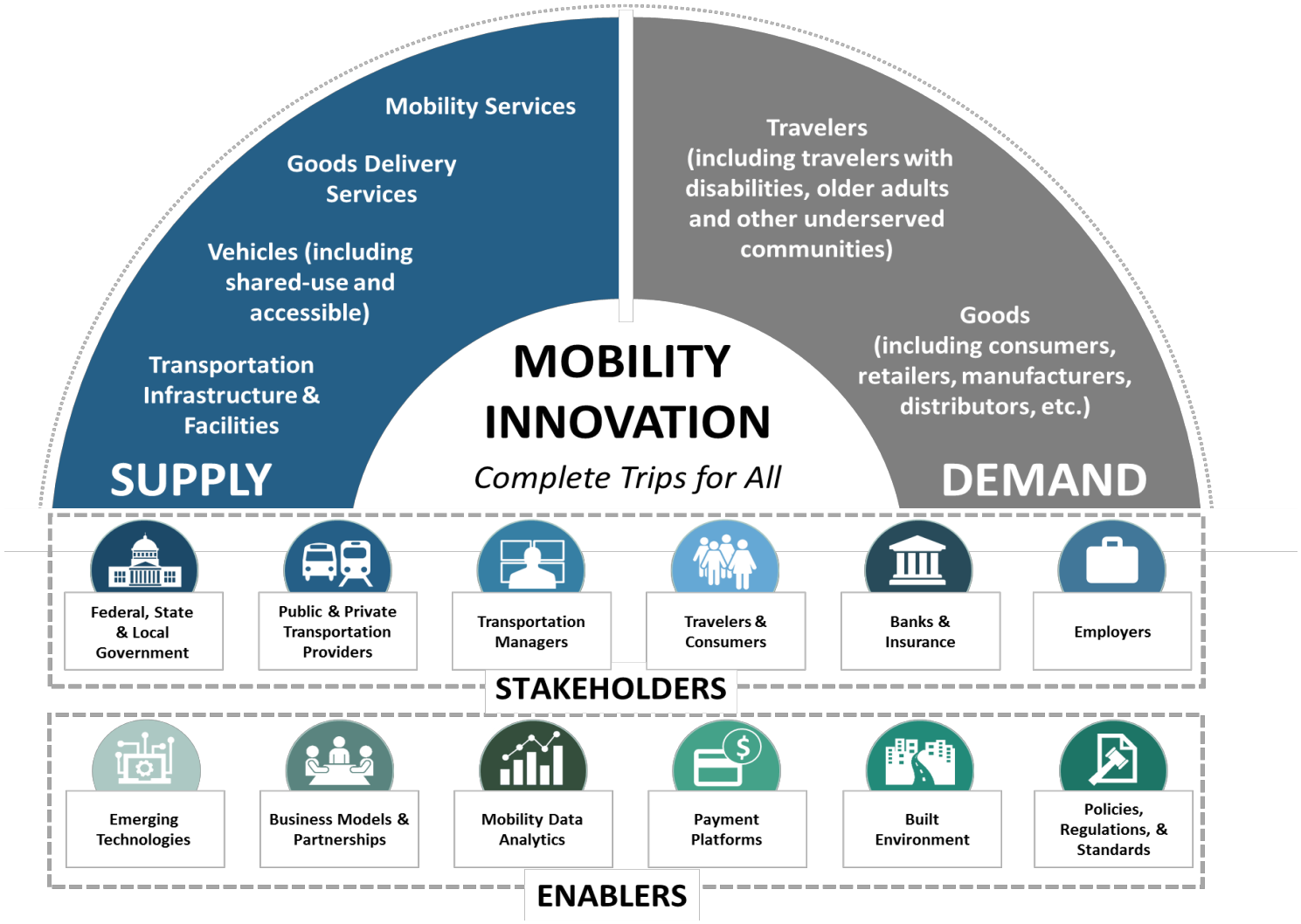


Public Transit is Being Disrupted

- **Traveler expectations have changed**
  - Smartphone payment, real-time information, 24/7 desire to be "connected", point-to-point convenience
- **Private sector now in the market** – public transportation as business destination
- **Bus technologies** – electric drive and "drive-by-wire" capabilities require new maintenance models
- **New technologies impacting operations**
  - Worker track identification (safety)
  - Real-time surveillance (security)
  - Telemetrics (asset management)
- **Transit Automation could expand public transit marketshare**

Disruption Provides Opportunities

- New public transit models can enhance economic development (TOD, value capture)
- Transit is cost-effective for riders
- Rider usage data is revenue
- Rail and bikeshare use growing
- Public/Private sector partnerships can increase access to rides
- Low and No Emission Bus market forecasting 400% growth
- Number of public transportation vehicles powered solely by electric battery has increased 210% since 2010 (NTD)
- Transit automation could drive even greater economic growth – 2 to 3% market share today; tomorrow?


Mobility Services
Goods Delivery Services
Vehicles (including shared-use and accessible)
Transportation Infrastructure & Facilities
SUPPLY
MOBILITY INNOVATION
Complete Trips for All
Travelers (including travelers with disabilities, older adults and other underserved communities)
Goods (including consumers, retailers, manufacturers, distributors, etc.)
DEMAND
Federal, State & Local Government
Public & Private Transportation Providers
Transportation Managers
Travelers & Consumers
Banks & Insurance
Employers
STAKEHOLDERS
Emerging Technologies
Business Models & Partnerships
Mobility Data Analytics
Payment Platforms
Built Environment
Policies, Regulations, & Standards
ENABLERS

Public Transit Market Conditions – Supply

- Private sector competition (“Coopetition”?)
- Labor shortages
- Increasing focus on safety
- Sharing, managing, optimizing resources
- Operating and capital expenses rising
- Off peak travel increasing
- Declining transit ridership
- IoT, Smart Communities, and Big Dat

Public Transit Market Conditions – Demand

- Increasing local transportation options
- Shifting traveler preferences and information expectations
- Expanding service area and time travel needs
- Trip planning across states/regions/modes
- Integration of new technologies
- Accessibility
- More need for rural options

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
- Adapt to change – embrace innovation

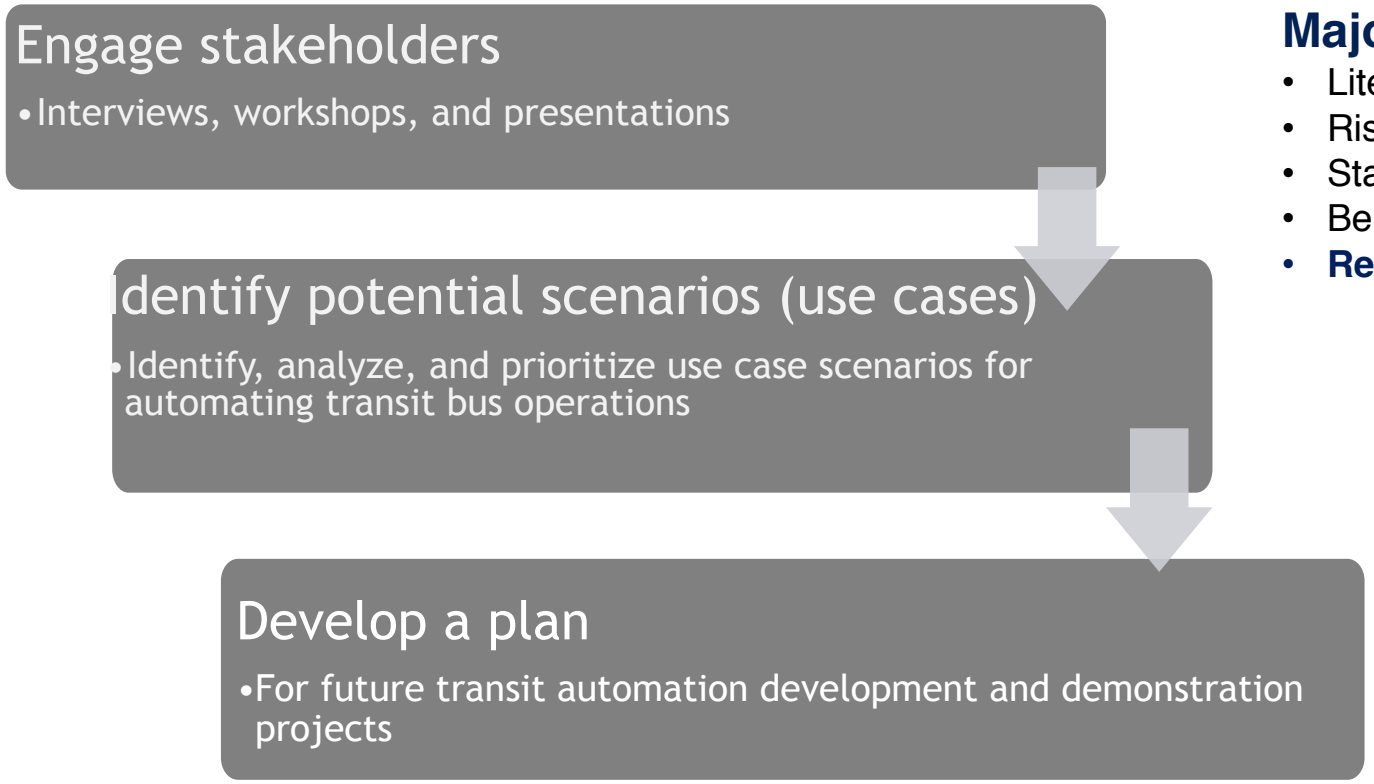
Transit Automation Research Goals

- **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



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

Transit Bus Advanced Driver Assistance System (ADAS)
Technology Package 1

- Circulator Bus Service
- Feeder Bus Service

Automated Shuttle
Technology Package 2

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

Maintenance, Yard, Parking Operations
Technology Package 3

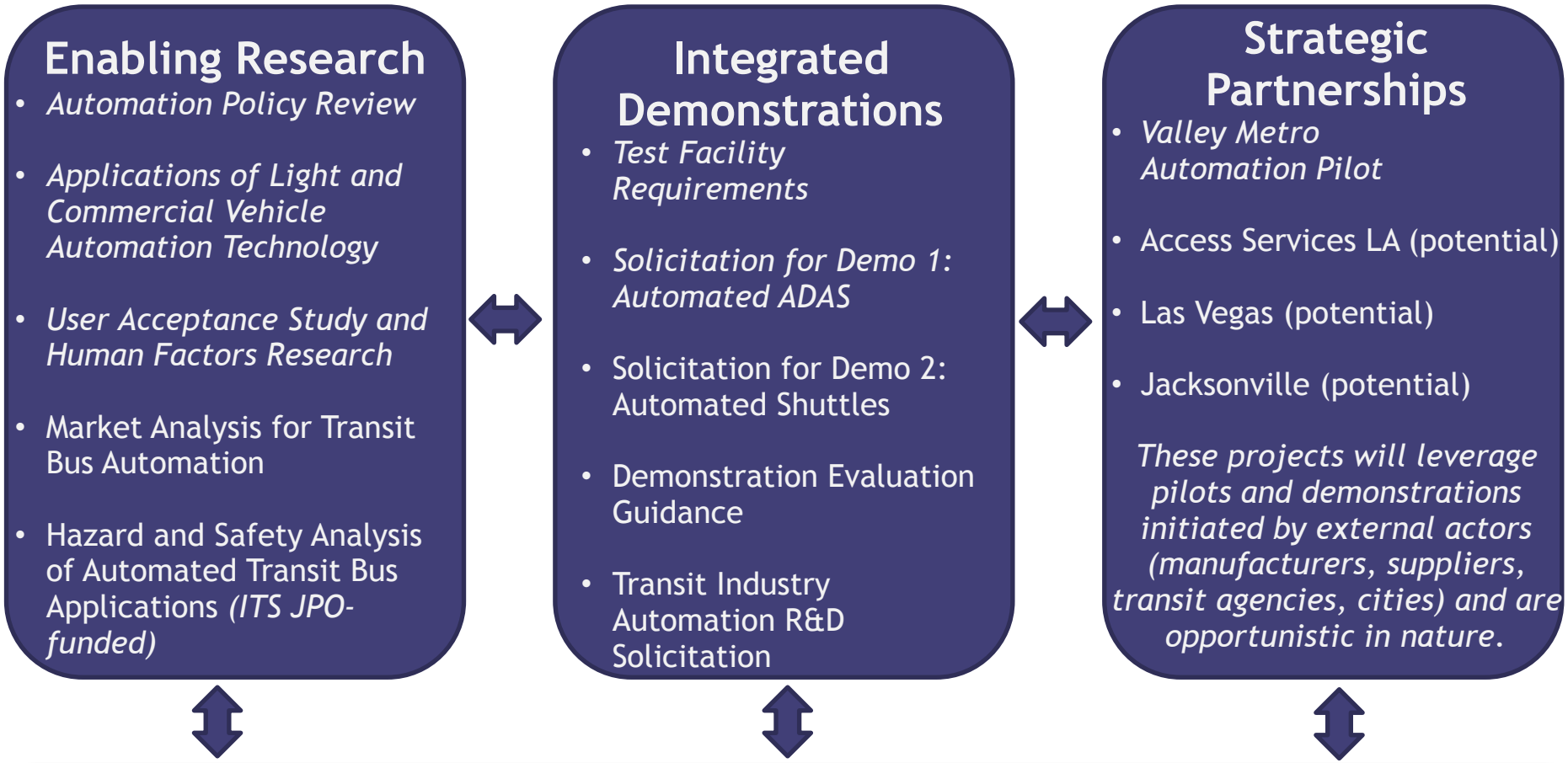
- Automated First/Last-mile
- Automated ADA Paratransit
- On-Demand Shared Ride

Mobility-on-Demand (MOD) Service
Technology Package 4

- Automated Bus Rapid Transit

Automated Bus Rapid Transit
Technology Package 5

Automation Research Activities



Integrated Mobility Challenges

- **Mobility on Demand: The challenge -** travelers need more transportation options that are easier to access and use.

- **Multimodal Payment**: **The challenge –** different payments systems across U.S. transportation modes

- **Transit Automation: The challenge -** the safe, effective and thoughtful adoption and integration of this new technology

Mobility Innovation Research

- Integrated Mobility Initiative (IMI)
- Objective: ***Integrated*** **Demonstrations**
  - Mobility on Demand Sandbox (Round 2)
  - Multimodal Integrated Payment Systems
  - Transit Automation

Source: Shared Use Mobility Center

Cross-Cutting Research Issues

- Institutional governance and culture/business practices
- Workforce/Training
- Policy
- Data
- Automation/Technology
- Standards/Regulations